Digital I/O
Daughter Board

User's Manual

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1. DIO Daughter Board

We provide all kind magnetic relay, SSR, open-collector, photo-mos relay and isolated digital input, daughter boards for I/O control applications.

1.1. How to select daughter board

You must make sure which digital I/O board you choose and what kind applications you designed. Then select suitable daughter board.

- Selection criteria for output type daughter board
  1. Type of contact load
     AC or DC? ; Resistive or inductive or capacitate or lamp? ; Occurrence of back electromotive force or inrush current?
  2. Level of contact load.
     Power load or small signal?
  3. Coil rated voltage
     12Vdc or 24Vdc?
  4. Frequency in switching operation
  5. Demand for life in switching operation
  6. Connector type of digital I/O board
     20-pin or 50-pin Flat cable or D-sub cable?
  7. Mounting
     Panel mounting or DIN-rail mounting
- Selection criteria for input type daughter board
  1. Type of input signal
     AC or DC? Dry contact or wet contact?
  2. Level of input signal
  3. Connector type of digital I/O board
     20-pin or 50-pin Flat connector or D-sub connector?
  4. Mounting
     Panel mounting or DIN-rail mounting

1.2. Selection Table

Output Type Daughter Board

Spec.	DB-16R	DB-24R	DB-24RD
Type	Magnetic Relay	Magnetic Relay	Magnetic Relay
Contact Arrangement (Each channel)	1c(1 Form C)	1C(1 Form C)	1C(1Form C)
Channel number	16	24	24
Contact rating	0.5A/120VAC 1A/30VDC	0.5A/120VAC 1A/30VDC	0.5A/120VAC 1A/30VDC
Expected Life (Rated Load)	200,000t	200,000t	200,000t
Coil rate voltage	12V (*1)	12V: DB-24R/12 24V: DB-24R/24	12V: DB-24RD/12 24V: DB-24RD/24
Connector	20-pin header	50-pin header	50-pin header & 37-pin D-sub connector
DIN-Rail Mounting	No	DB-24R/12/DIN DB-24R/24/DIN	DB-24RD/12/DIN DB-24RD/24/DIN
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Spec.	DB-24PR	DB-24PRD	DB-24C
Type	Magnetic Relay	Magnetic Relay	Open-collector
Contact Arrangement (Each channel)	1C(1 Form C) x 8 1A(1 Form A) x 16	1C(1 Form C) x 8 1A(1 Form A) x 16	NPN
Channel number	24	24	24
Contact rating	5A/250VAC 5A/30VDC	5A/250VAC 5A/30VDC	(100mA/30Vdc)x16 (600mA/30Vdc)x8
Expected Life (Rated Load)	200,000t	200,000t	Very Long life Maintenance free
Coil rate voltage	12V: DB-24PR/12 24V: DB-24PR/24	12V: DB-24PRD/12 24V: DB-24PRD/24	External Power supply : 30 Vdc max.
Connector	20-pin header 50-pin header	50-pin header & 37-pin D-sub connector	20-pin header & 50-pin header & 37-pin D-sub connector
DIN-Rail Mounting	DB-24PR/12/DIN DB-24PR/24/DIN	DB-24PRD/12/DIN DB-24PRD/24/DIN	DB-24C/DIN DB-24C/D/DIN
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Spec.	DB-24OD	DB-24SSR	DB-24POR
Type	Open-darin	Solid-state Relay	PhotoMos Relay
Contact Arrangement (Each channel)	N-MOS	1A (1 Form A)	1A (1 Form A)
Channel number	24	24	24
Contact rating	250mA	4A / 50-250VAc	
Expected Life (Rated Load)	Very Long life Maintenance free	200,000t	200,000t
Coil rate voltage	External Power supply : 30 Vdc max.	12V: DB-24PRD/12 24V: DB-24PRD/24	12V: DB-24PRD/12 24V: DB-24PRD/24
Connector	20-pin header & 50-pin header & 37-pin D-sub connector	20-pin header 50-pin header	50-pin header & 37-pin D-sub connector
DIN-Rail Mounting	DB-24C/DIN DB-24C/D/DIN	DB-24SSR/DIN DB-24SSR/D/DIN DB-24SSR/D/P/DIN	DB-24POR/DIN DB-24POR/D/DIN
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Spec.	DB-16P8R (*)
Type	Magnetic Relay
Contact Arrangement (Each channel)	1C (1 Form C)
Channel number	8
Contact rating	(100mA/30Vdc)x16 (600mA/30Vdc)x8
Expected Life (Rated Load)	30,000t
Coil rate voltage	24V only
Connector	20-pin header & 50-pin header & 37-pin D-sub connector
DIN-Rail Mounting	DB-16P8R/DIN DB-16P8R/D/DIN
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Input Type Daughter Board

Spec.	DB-16P	DB-24P	DB-24PD
Type	Optically Isolated	Optically Isolated	Optically Isolated
Channels	16	24	24
Input Range	5~24V DC/AC	5~24V DC/AC	5~24V DC/AC
Input Impedance	1.2K ohm	1.2K ohm	1.2K ohm
connector	20-pin header	50-pin header	50-pin header 37-pin D-sub connector
DIN-Rail Mounting	No	DB-24P/DIN	DB-24PD/DIN
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Spec.	DB-16P8R
Type	Optically isolated or dry contact
Channels	16
Input Range	5~24V DC or Dry contact
Input Impedance	1.2K ohm
connector	50-pin header, 37-Pin D-sub connector
DIN-Rail Mounting	DB-16P8R/DIN or DB-16P8R/D/DIN
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(*) DB-16P8R :

16-channel isolated digital input and 8-channel relay output daughter board

2. DB-16R 16 Relay Output Board

The DB-16R, 16 channel Relay Output Board, consists of 16 form c relays for efficient switch of load by programmed control. It is connector and functionally compatible with 785 series board but with industrial type terminal block. The DB-16R can be connected to DIO-64, A-626, A82x DAS board and PCI-series multi-function board or any other compatible DAS board. The relay are energized by apply 5 volt signal to the appropriate relay channel on the 20-pin flat cable connector. 16 enunciator LEDs, one for each relay, light when their associated relay is activated. To avoid overloading your PC's power supply, this board provides a screw terminal for external power supply.

2.1. Features

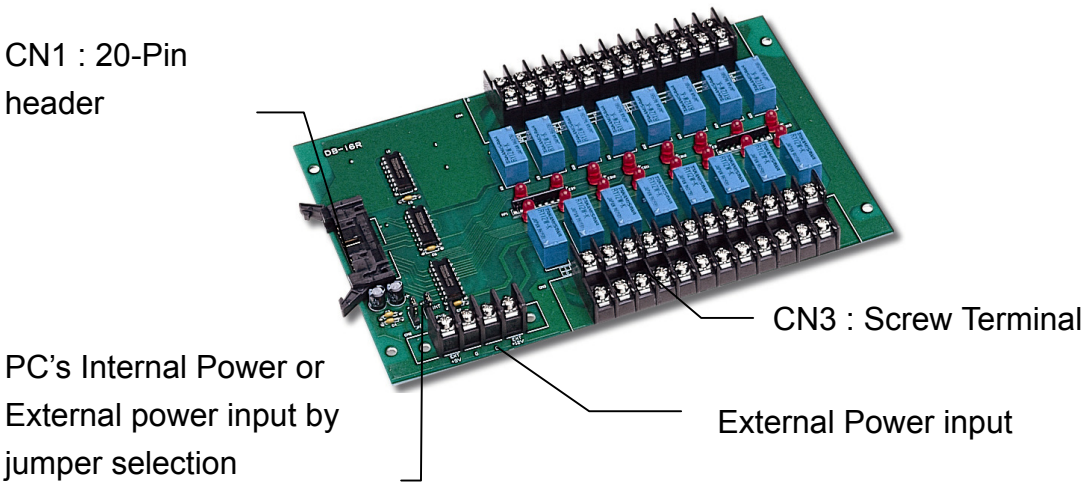
16-channel relay output board

- 16 Form C Relays
- Accept 20-pin connector to control 16 form c relays, for use with A-82X, A-62X, DIO-64, PCI-1800, PCI-1200, PCI-1002 series digital output port or any compatible digital output port.
- LED status indicator
- Screw terminals for field wiring.

2.2. Specifications

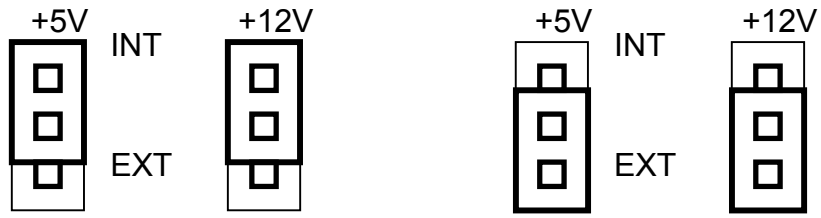
- Type : form c
- Nominal load :…….0.5 A/120VAC , 1A /24VDC
- Max. Switching Power : …….60VA,24W
- Max. Switching Voltage : ……..120VAC , 60VDC
- Max. Switching Current : ……...1A
- Life Expectancy : ……Electrical (20 Millions Times)
- Time Value : Operate …….6ms
- Release ……..…….3ms
- Control Logic : ……Input TTL high (+5V) , relay on
- Power consumption : ……..……12 V /0.53A ; 5V /0.2 A
- Dimensions: ……..…….....8 inch (205mm) x 4.5 inch (114mm)
- Operating Temperature :……... 0 - 60°C
- Storage Temperature : ……..…0-60°C
- Humidity : ……5% to 90% Non condensing

2.3. Layout


CN1 : 20-Pin header
CN3 : Screw Terminal
PC's Internal Power or External power input by jumper selection
External Power input

2.4. Jumper Setting

DB-16R PC's internal power or external power input by jumper selection.



Select Internal Power
*Default Setting

Select External Power

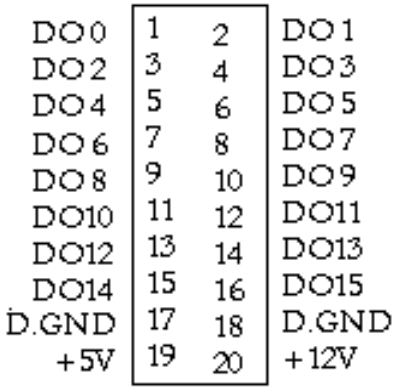
Note: INT: Internal Power Source
EXT: External Power Source

Don't install too much DB-16R in one PC if the jumper is set in the internal power. Some PC's power supply is small and used to power PC only. The power supply will be damaged, if install too much DB-16R and using internal power. You should calculate the power consumption of DB-16R and to make sure which setting is better.

2.5. Pin Assignment

The CN1 is 20-pin header linked to TTL digital I/O board via 20-pin flat cable.
The CN2 is an external power input connector for external power input wiring.
The CN3 and CN4 are relay contact screw terminal blocks.

DB-16R -CN1 : 20 Pin connector



CN2: External Power Input Connector

+5V	**GND**	**GND**	**+12V**

Note : Don't wiring to external power input connector if the power selection jumper setting in < INT > position.

CN3 Relay contact terminal block

8	NO	NC	CM	10	NO	NC	CM	12	NO	NC	CM	14	NO	NC	CM
9	NO	NC	CM	11	NO	NC	CM	13	NO	NC	CM	15	NO	NC	CM

CN4 Relay contact terminal block

1	NO	NC	CM	3	NO	NC	CM	5	NO	NC	CM	7	NO	NC	CM
0	NO	NC	CM	2	NO	NC	CM	4	NO	NC	CM	6	NO	NC	CM

3. DB-16P 16 Opto-Isolated Digital Input Terminal Board

The DB-16P is a 16 channel isolated digital input daughter board for A-82x DAS board or any 812PG, 711 series DAS boards. The optically isolated inputs of the DB-16P consist of a bi-directional LED with a resistor for current sensing. You can use the DB-16P to sense DC signal from TTL levels up to 24V. You can also use DB-16P to sense a wide range of AC signals. The DB-16P registers a constant logic high if the frequency of the input AC signal is greater or equal to 1 kHz, and the voltage of the AC signal is at least 4Vrms. If you are using AC input signal, you should short the AC filter Jumper. You can use the board to isolate the computer from large common-mode voltages, ground loops, and voltage spikes that often occur in industrial environments.

3.1. Features

- 16 optically isolated digital input
- Connected to DIO-64, A-62X, A-82x data acquisition boards
- AC/DC Signal Input
- AC Signal Input with filter
- Input buffer with voltage comparators
- 3,000V isolation
- Each channel has it’s LED indicator

3.2. Specifications

- I/O connector Electrical Specifications
  Configuration: optically isolated digital input channels
  Compatibility: TTL compatible
- Digital Input
  Number of channels: 16 Channels,
  each channel with its own ground
  reference isolated from other channels
  Maximum input voltage: 24 VDC or 24 VAC

  Digital Logic Level:

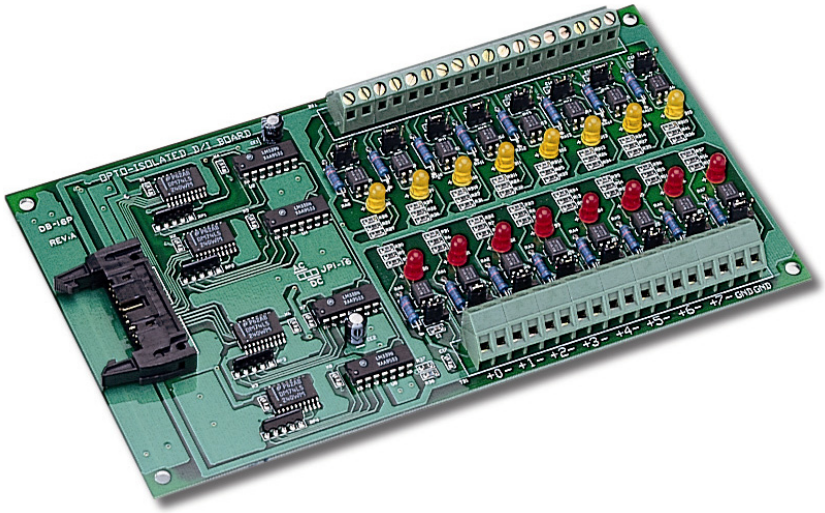
Level	Minimum	Maximum
Input low voltage (DC or peak AC)	0	+/-1V
Input high voltage DC 1kHz AC	+/- 3.8VDC 4Vrms	+/-24VDC 24VAC

  Input impedance: 1.2k
  Input Current
  5V inputs : 4 mA /channel
  24V inputs : 20 mA /channel
  Input Response Time :20μs without filter / 2.2ms with filter
- Power consumption 220mA/ +5V (Max) from PC
- Board Dimension : 8.06 “ (205mm) X 4.5 “(114mm)
- Operating Environment
- Component temperature : 0 to 50°C
- Relativity humidity : 5% to 90% non condensing
- Storage Environment
  Temperature: 0-60°C
  Relative humidity: 5% to 90 % non condensin

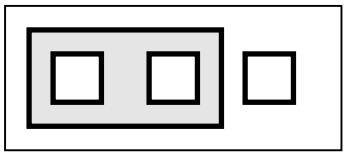
3.3. Applications

- Isolated digital input sensing
- Process monitoring

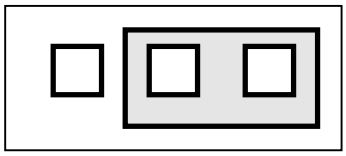
3.4. Layout



3.5. Jumper setting

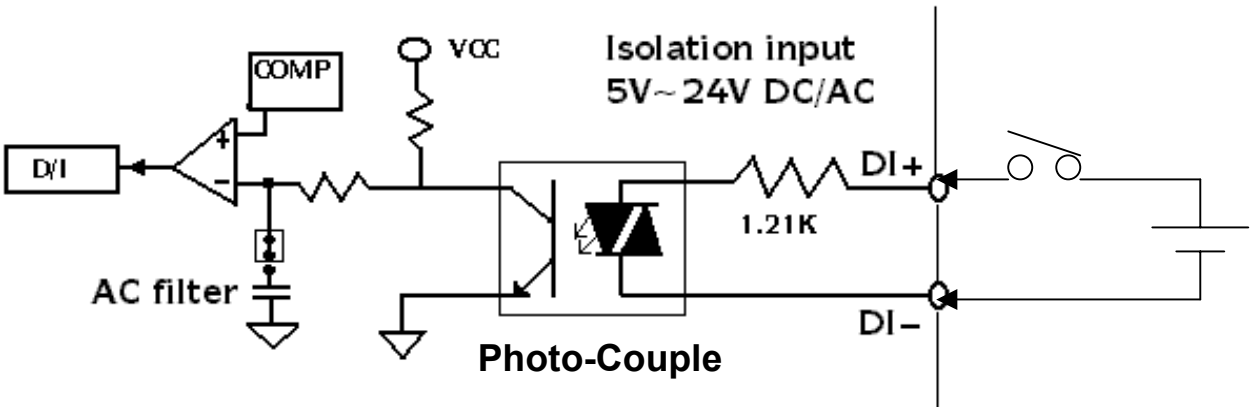


With filter for AC signal



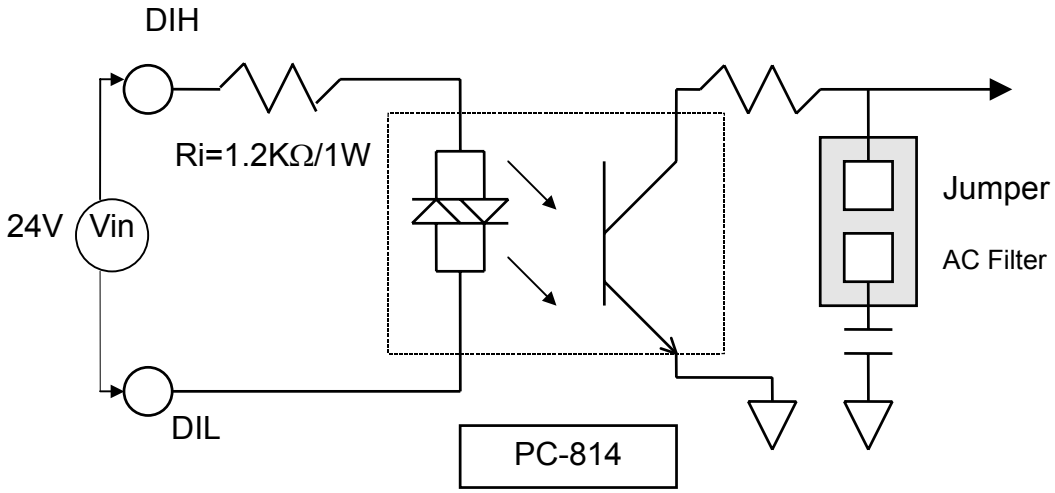
Without filter for DC signal

If you are using AC signal, You must short the AC FILTER jumper.
If you are using DC input signals, the AC FILTER is optional. If the response time of input signals less than 20μs, set the filter off. If you want a slow response (about 5 to 10 ms) for rejecting noise or contact bouncing, short the AC FILTER jumper.



3.6. Isolated Input

The normal input voltage range is 5 to 24 V AC or DC . The normal input range can be changed by choosing suitable resistor to limit the current through the Photo-isolator to about 10 mA(**I**f). The default resistor is 1.2KΩ/1 W.



Ri = Vin/**I**f

Pw = **V**in x **I**f

Calculation Example:

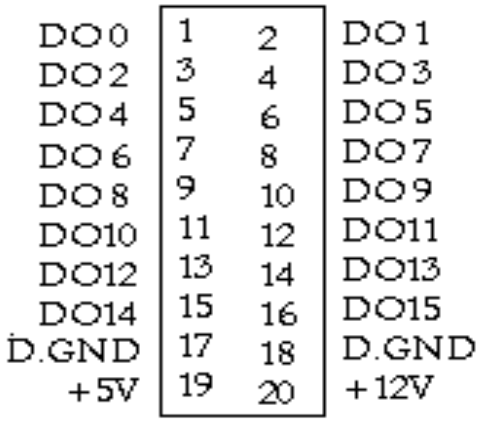
If **V**in =120V then **R**i=120(V) /0.01(A)=12KΩ

Pw=120(V) x 0.01(A) =1..2W

The **R**i must be replaced by 12KΩ/2W(1.2W)

3.7. Pin Assignment

- CN1 Pin assignment



- TB1 Pin assignment

Pin Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Label	0H	0L	1H	1L	2H	2L	3H	3L	4H	4L	5H	5L	6H	6L	7H	7L	F.G.	F.G.

- TB2 Pin assignment

Pin Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Label	8H	8L	9H	9L	10H	10L	11H	11L	12H	12L	13H	13L	14H	14L	15H	15L	+5V.	+12V

4. DB-16P8R

The DB-16P8R is a 16-channel isolated/non-isolated input & 8-channel relay output board. The isolated digital input can be used to sense 3.5V to 24V DC signal. The non-isolated digital input are used to sense dry contact. The relay output consists of 16 form C power relays. The user can use this board to isolate the computer from large common-mode voltage, ground loops and transient voltage spike that often occur in industrial environments.

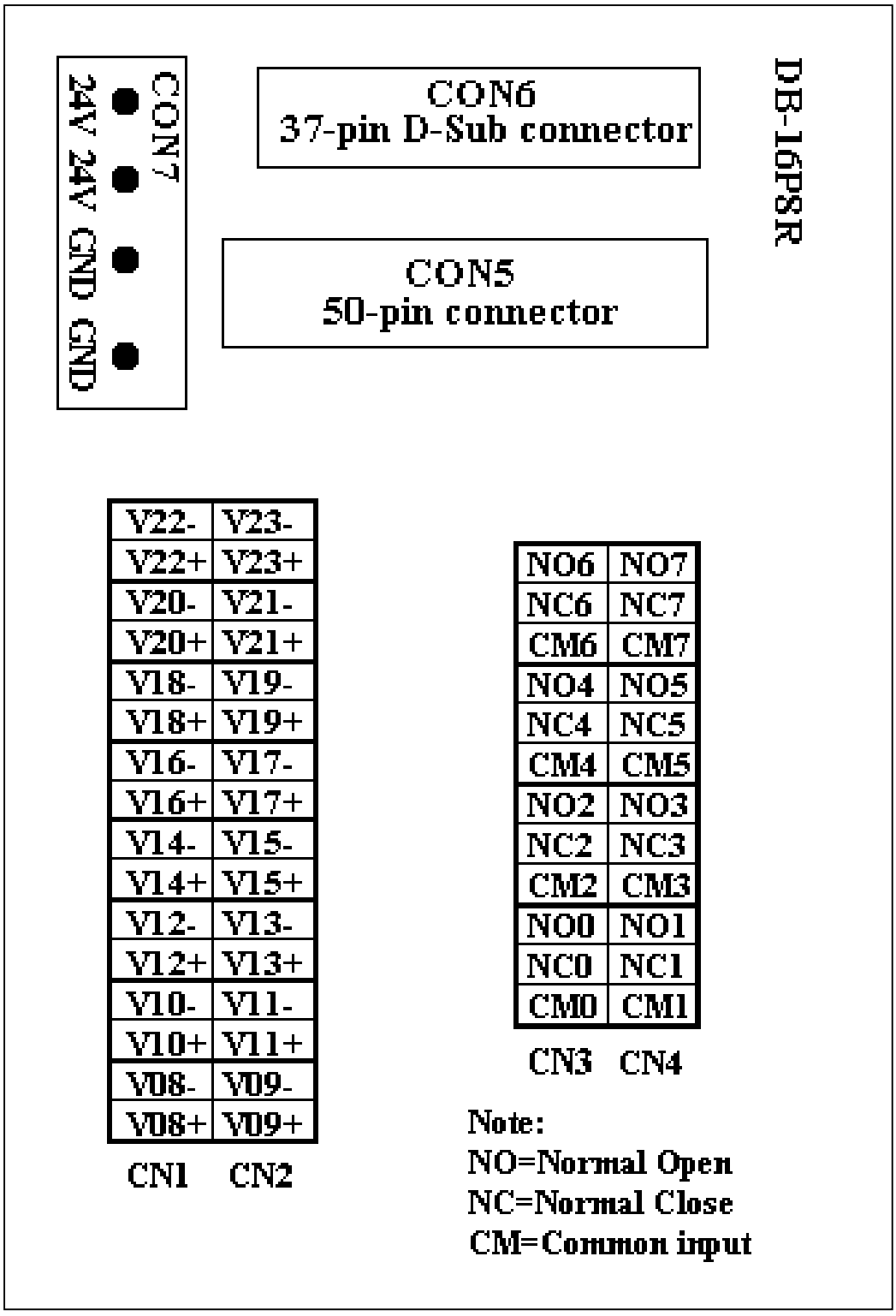
4.1. Specification

- Isolated Digital Input
  Isolation voltage: 3750V
  Input voltage: 3.5V to 24V
  Response time: 10K Hz Max.
- Dry Contact Input (non-isolated input)
  Logic high: input close
  Logic low: input open
- Power Relay
  Type 1 form C (SPDT)
  Rating:
    - Nominal Load …… 250VAC/5A
    - MAX. Switching Power …… 1,250VA(NO), 750VA(NC)
    - MAX. Switching Voltage ……... 250VAC, 150VDC
    - MAX. Switching Current …… 5A

  Life expectancy:
    - Mechanical …….. 10 millions operations

  Time Value:
    - Operate …… 10 ms
    - Release ……. 5 ms
- Varistor for power reply
  Power consumption:
    - Min …….. 2.5uA (All relays off)
    - Max ……. 0.5A (All relays on)
    - Relay On ……. 22mA (for single relay)
- Operating Temperature: 0 ~ 60 ℃
- Storage Temperature: -20 ~ 70 ℃
- Humility: 5% to 95% noncondensing
- Power consumption: 24V @ 0.3A, 5V @ 0.1A
- Dimension: 130mm x 210mm

4.2. Board Layout



V22-	V23-
V22+	V23+
V20-	V21-
V20+	V21+
V18-	V19-
V18+	V19+
V16-	V17-
V16+	V17+
V14-	V15-
V14+	V15+
V12-	V13-
V12+	V13+
V10-	V11-
V10+	V11+
V08-	V09-
V08+	V09+

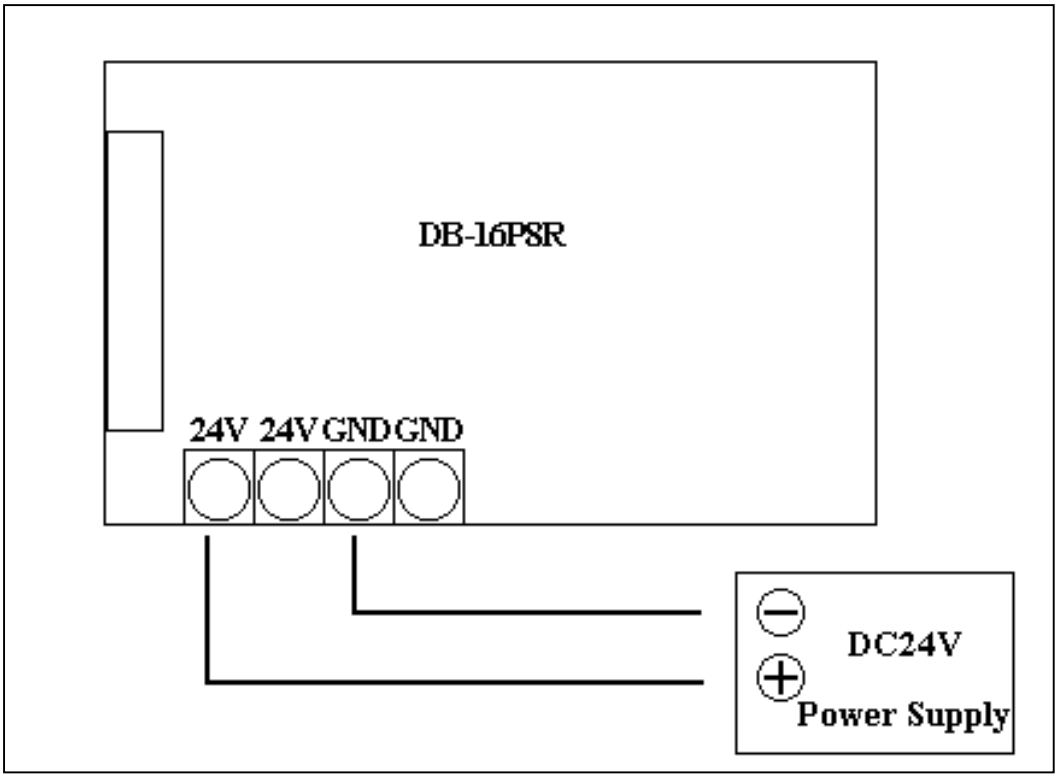
CN1 CN2

NO6	NO7
NC6	NC7
CM6	CM7
NO4	NO5
NC4	NC5
CM4	CM5
NO2	NO3
NC2	NC3
CM2	CM3
NO0	NO1
NC0	NC1
CM0	CM1

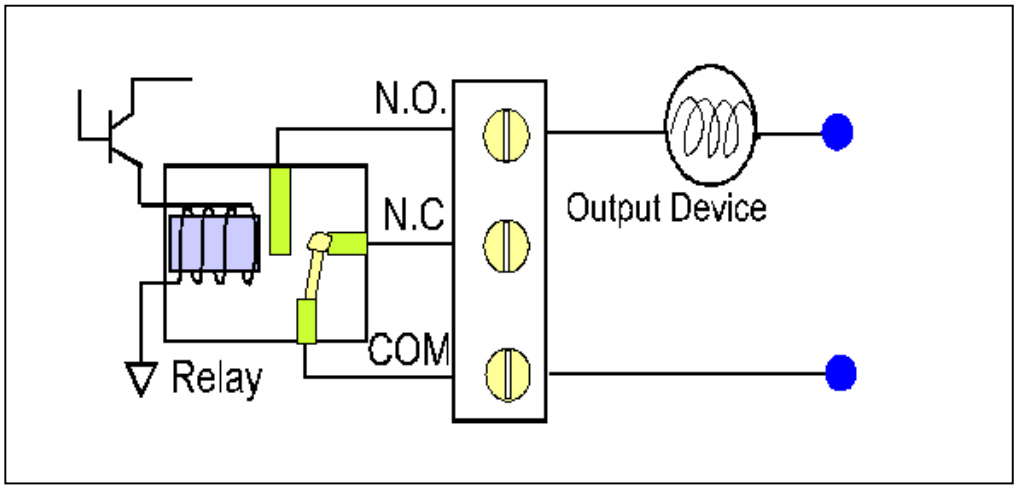
CN3 CN4

Note:
NO=Normal Open
NC=Normal Close
CM=Common input

4.3. External Power & Relay Output



Relay Output



4.4. Digital Input Configuration

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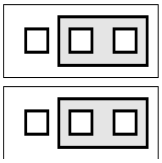
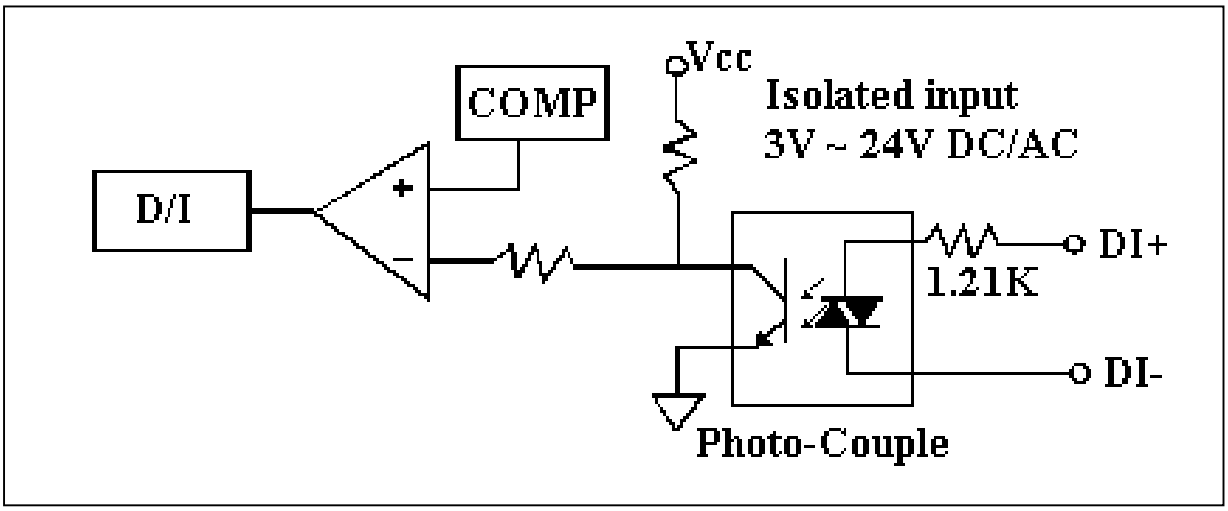
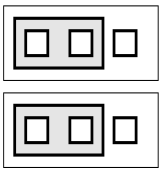


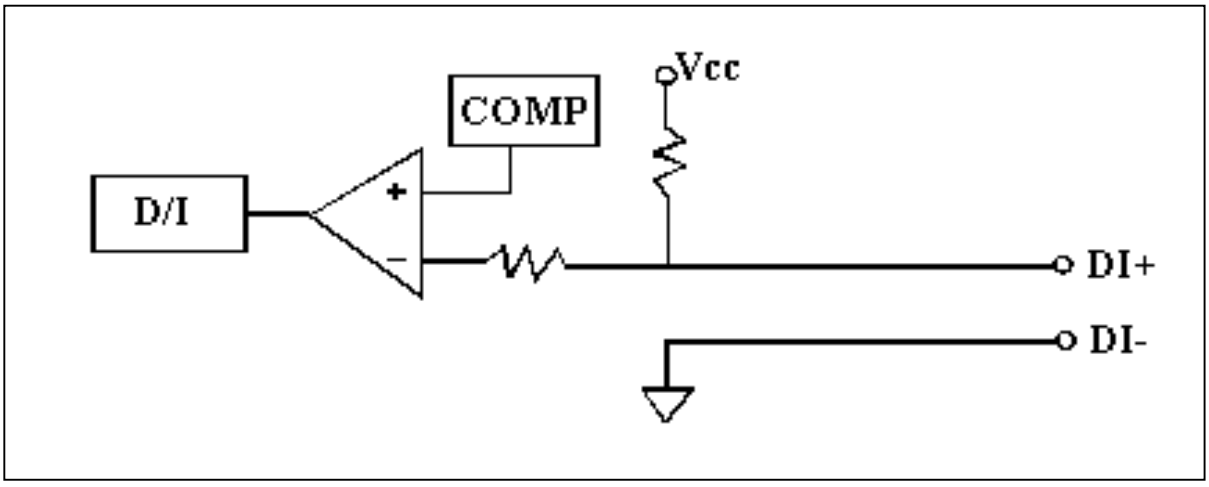
Select Isolated D/I



JP??



Select Non-Isolated D/I



4.5. LEDs & Jumper Mapping

OPTO-22	LEDs	Relays / DIs		CON5(50-pin)	CON6(30-pin)
PA0	LED0	Relay-0		Pin-47	Pin-37
PA1	LED1	Relay-1		Pin-45	Pin-36
PA2	LED2	Relay-2		Pin-43	Pin-35
PA3	LED3	Relay-3		Pin-41	Pin-34
PA4	LED4	Relay-4		Pin-39	Pin-33
PA5	LED5	Relay-5		Pin-37	Pin-32
PA6	LED6	Relay-6		Pin-35	Pin-31
PA7	LED7	Relay-7		Pin-33	Pin-30
PB0	LED8	DI-8	JP8	Pin-31	Pin-10
PB1	LED9	DI-9	JP9	Pin-29	Pin-9
PB2	LED10	DI-10	JP10	Pin-27	Pin-8
PB3	LED11	DI-11	JP11	Pin-25	Pin-7
PB4	LED12	DI-12	JP12	Pin-23	Pin-6
PB5	LED13	DI-13	JP13	Pin-21	Pin-5
PB6	LED14	DI-14	JP14	Pin-19	Pin-4
PB7	LED15	DI-15	JP15	Pin-17	Pin-3
PC0	LED16	DI-16	JP16	Pin-15	Pin-29
PC1	LED17	DI-17	JP17	Pin-13	Pin-28
PC2	LED18	DI-18	JP18	Pin-11	Pin-27
PC3	LED19	DI-19	JP19	Pin-9	Pin-26
PC4	LED20	DI-20	JP20	Pin-7	Pin-25
PC5	LED21	DI-21	JP21	Pin-5	Pin-24
PC6	LED22	DI-22	JP22	Pin-3	Pin-23
PC7	LED23	DI-23	JP23	Pin-1	Pin-22

Note:
1. JP8 to JP23 select isolated / non-isolated digital input. Refer to Sec.1.4 for more information.
2. JP8 select DI-8
3. JP9 select DI-9
4. ……..
5. JP23 select DI-23

4.6. Pin Assignment of CON5 & 6

CON6: 37-pin D-Sub connector

Pin Number	Description	Pin Number	Description
1	N.C	20	VCC
2	N.C.	21	GND
3	PB7	22	PC7
4	PB6	23	PC6
5	PB5	24	PC5
6	PB4	25	PC4
7	PB3	26	PC3
8	PB2	27	PC2
9	PB1	28	PC1
10	PB0	29	PC0
11	GND	30	PA7
12	N.C	31	PA6
13	GND	32	PA5
14	N.C.	33	PA4
15	GND	34	PA3
16	N.C.	35	PA2
17	GND	36	PA1
18	VCC	37	PA0
19	GND	XXXXX	This pin is not available

5. DB-24R / DB-24RD

The DB-24R / DB-24RD, 24 channel Relay Output Board, consists of 24 form c relays for efficient switch of load by programmed control. The DB-24R can be connected to DIO-24, DIO-48, DIO-D96, DIO-144, PIO-D144, PIO-D96 and PIO-D48 and any other OPTO-22 compatible Digital I/O board The relays are energized by apply 5 volt signal to the appropriate relay channel on the 50-pin header or 37-pin D-sub connector (DB-24RD). Twenty-four enunciator LEDs, one for each relay, light when their associated relay is activated. This board provides a screw terminal for external power supply.

5.1. Features

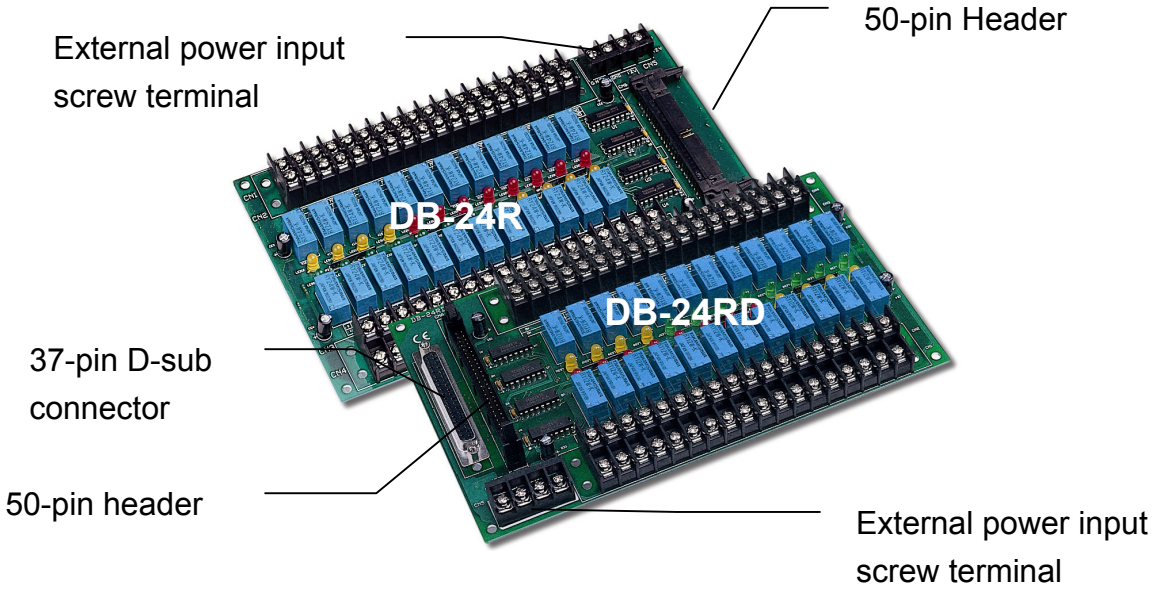
- **DB-24R**
- 24 Form C Relays.
- Contact rate up to 0.5A/120Vac , 1A/30Vdc
- Accept 50-pin OPTO-22 compatible header, For DIO-24, DIO-48, DIO-144 and PIO-series digital output port or any OPTO-22 compatible digital output port.
- LED indicate relay status.
- Screw terminals for filed wiring.

- **DB-24RD**
- Accept 50-pin header and 37-pin D-sub connector
  1. Accept 50-pin OPTO-22 compatible header, For DIO-24, DIO-48 , DIO-144 and PIO-series digital output port or any OPTO-22 compatible digital output port.
  2. The 37-pin D-sub connector can be directly connected to PIO-D144, PIO-D96, PIO-D48, PIO-D56 and PIO-D24.
- 24 Form C Relays.
- Contact rate up to 0.5A/120Vac , 1A/30Vdc
- LED's indicate relay status.
- Screw terminals for filed wiring.

5.2. Specification

- Type : form c
- Nominal load :…… 0.5 A/120VAC , 1A /24VDC
- Max. Switching Power : … 60VA,24W
- Max. Switching Voltage : …120VAC , 60VDC
- Max. Switching Current : …1A
- Life Expectancy : …… Electrical (20 Millions Times)
- Time Value : Operate …… 6ms
- Release ……..... 3ms
- Control Logic : …… Input TTL high (+5V) , relay on
- Power consumption : ……..12 V /0.53A ; 5V /0.2 A
- Dimensions : ……..... 8 inch (205mm) x 4.5 inch (114mm)
- Operating Temperature :… 0 - 60°C
- Storage Temperature : ……0-60°C
- Humidity : …… 5% to 90% Non condensing

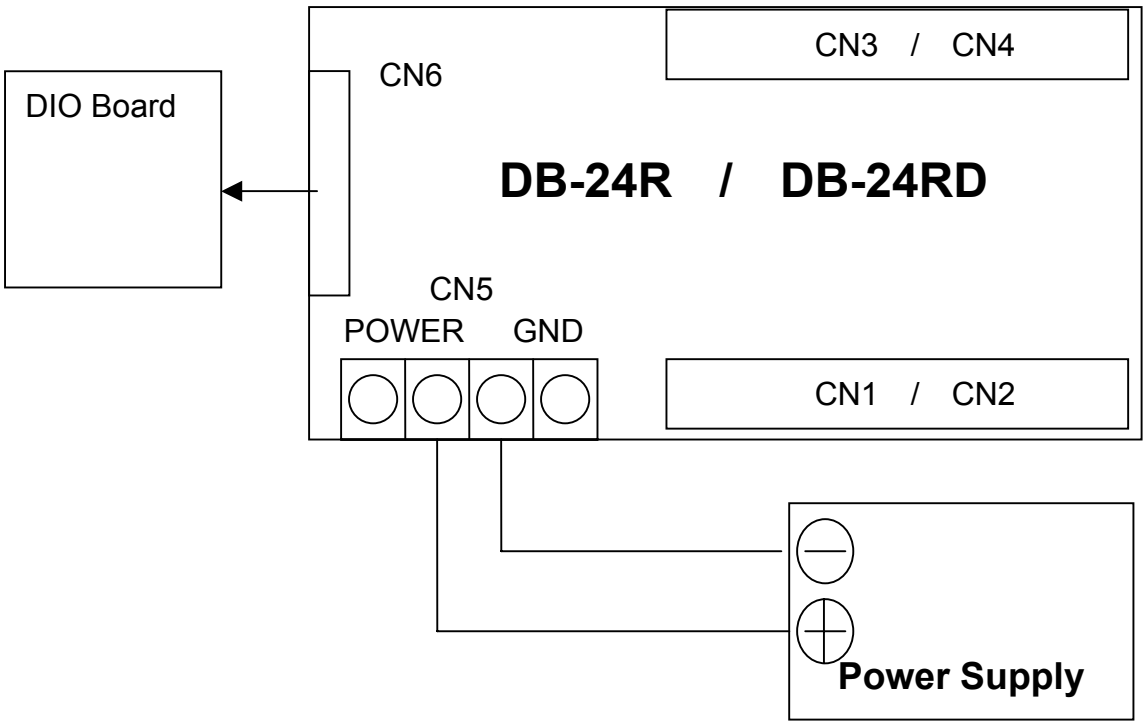
5.3. Layout



DB-24PR and DB-24R support external power supply only.

DB-24R/12V, DB-24RD/12V for DC 12V external power supply

DB-24R/12V, DB-24RD/24V for DC 24V external power supply

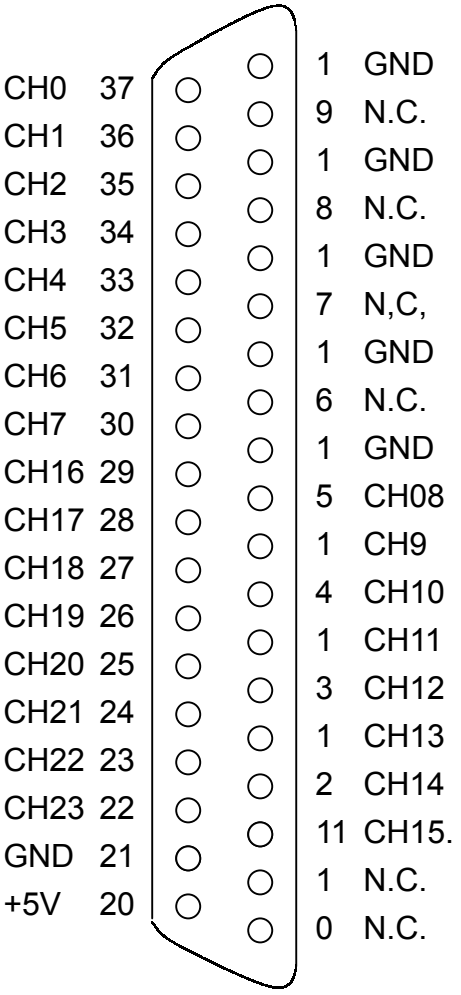


5.4. Pin Assignment

CN6: OPTO-22 50-Pin Header Pin assignment for DB-24R and DB-24RD

GND	50	○	○	49	+5V input
GND	48	○	○	47	CH0
GND	46	○	○	45	CH1
GND	44	○	○	43	CH2
GND	42	○	○	41	CH3
GND	40	○	○	39	CH4
GND	38	○	○	37	CH5
GND	36	○	○	35	CH6
GND	34	○	○	33	CH7
GND	32	○	○	31	CH8
GND	30	○	○	29	CH9
GND	28	○	○	27	CH10
GND	26	○	○	25	CH11
GND	24	○	○	23	CH12
GND	22	○	○	21	CH13
GND	20	○	○	19	CH14
GND	18	○	○	17	CH15
GND	16	○	○	15	CH16
GND	14	○	○	13	CH17
GND	12	○	○	11	CH18
GND	10	○	○	9	CH19
GND	8	○	○	7	CH20
GND	6	○	○	5	CH21
GND	4	○	○	3	CH22
GND	2	○	○	1	CH23

CN7 : 37-pin D-sub connector
Pin-Assignment for DB-24RD only



CN5 : External Power Connector

+12V	**+12V**	**GND**	**GND**

Note : Input DC+12V power for optional 12V version
Input DC+24V power for optional 24V version

CN 1 /CN 2 : Screwing terminal

CH 12	CH 14	CH 16	CH 18	CH 20	CH 22
CH 13	CH 15	CH 17	CH 19	CH 21	CH 23

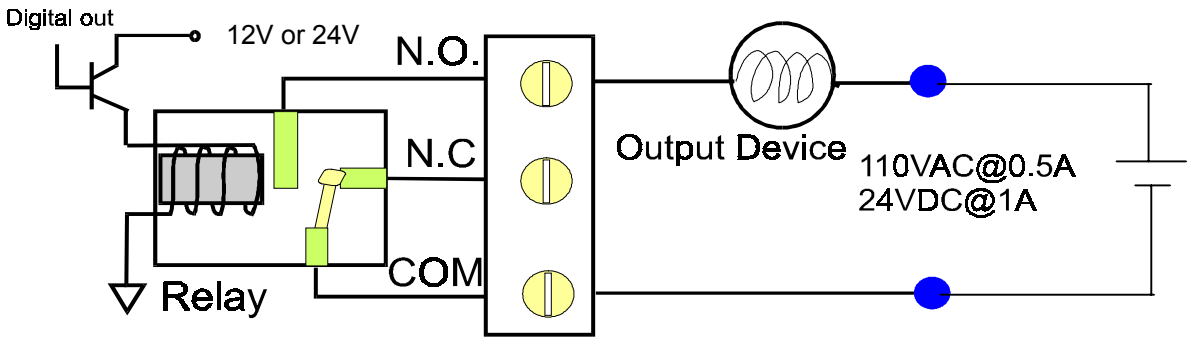
CN 3 / CN 4 : Screwing terminal

CH 0	CH 2	CH 4	CH 6	CH 8	CH 10
CH 1	CH 3	CH 5	CH 7	CH 9	CH 11

Each Channel

CH 0~23		
MC(common)	NC(normal close)	NO(normal open)_

Form C Relay



6. DB-24PR / DB-24PRD

The DB-24PR / DB-24PRD, 24 channel power relay output board, consists of 8 form C & 16 form A electromechanical relays for efficient switching of load by programmed control. The contact of each relay can control a 5A load at 250VAC/30/VDC. The relay are energized by applying 5 voltage signal to the appropriated relay channel on the 20-pin header (DB-24PR only), 50 pin header and 37-pin D-sub connector (DB-24PRD only). Twenty-four enunciator LEDs, one for each relay, light when their associated relay is activated. To avoid overloading your PC's power supply, this board provides a screw terminal for power supply. CN1, CN2, CN3 and CN4 are terminal blocks to connect with wiring. The CN7 is used to connect with DIO-24, DIO-48, DIO-144 or any OPTO-22 compatible digital output port. The CN6 is used to connect with A-82XPG series PCI-1800 series ISO-DA series, DIO-64 or any compatible digital output port. The DB-24PRD has one 37-pin D-sub connector. The 37-pin D-sub connector can be directly connected to PIO-D144, PIO-D96, PIO-D48 and PIO-D24's 37-pin D-sub connector.

6.1. Features

- **DB-24PR**
- 16 form A relays, 8 form C relays.
- DB-24PR accept two kind connectors:
  CN6 accepts 20-pin header to control 8 form C (channel 0~7) relays and 8 form A relays (channel 8~15).
  CN5 accepts 50-pin header to control 8 form C relays and 16 form A relays.
- Each varistor protect one contact.
- LED indicate relay status.
- **DB-24PRD**
- DB-24PRD accept two kind connectors:
  One 37-pin D-sub connector for PIO-D144, PIO-D96, PIO-D48, PIO-D56 and PIO-D24 digital I/O boards
  One 50-pin header for DIO-144, DIO-96, DIO-48 and DIO-24 digital I/O boards. Other features are the same as DB-24PR.

6.2. Specifications

- Form A relays

  Type : 1 form A (SPST-NO)

  Rating :

  Nominal Load ……..….....5A 250VAC or 30VDC

  Max. Switching Power……..... 90W

  Max Switching Voltage…….....270VAC,150VDC.

  Max. Switching Current…….....5A

  Life expectancy:

  Mechanical……..….....…20 millions operations

  Time Value:

  Operate……...……10ms

  Release……...…….5ms

- Form C Relays

  Type : 1 form C (SPDT)

  Rating :

  Nominal Load …….. 250VAC / 5A.

  MAX. Switching Power…….1,250VA(NO) , 750VA(NC)

  MAX. Switching Voltage……..250VAC , 150VDC

  MAX. Switching Current ……..5A

  Life expectancy:

  Mechanical ……10 millions operations

  Time Value:

  Operate……..10ms

  Release……..……5ms

- Varistor:

  Power consumption:

  Min : ……..2.5uA (All relays off)

  Max :……..……0.5 A (All relays On)

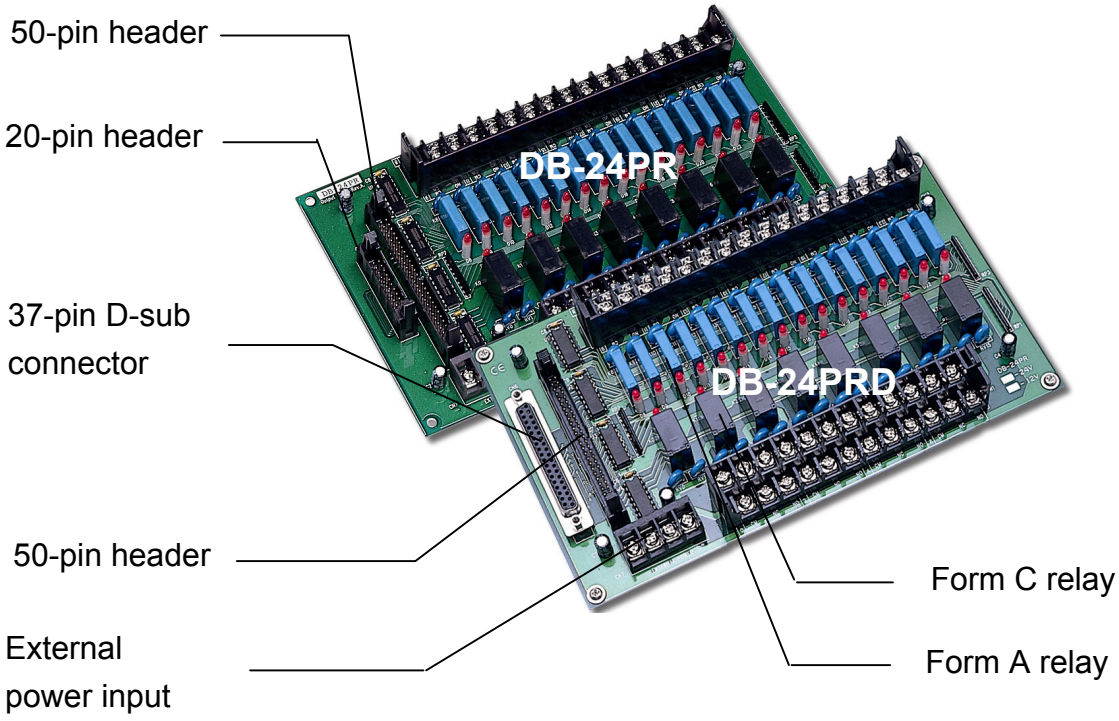
  1 relay On : …… 22mA

- Dimensions: 1339 (W) mm X 220 (D) mm

6.3. Applications

- Test Automation
- Laboratory & Factory Automation
- On/Off Control

6.4. Layout



Note :

DB-24PR, DB-24PRD provides external power input only.

The input power has two versions:

External Power +12Vdc input for 12V Version

External Power +24Vdc input for 24V version

6.5. Pin Assessment

CN5 : 50-pin header
(DB-24PR & DB-24PRD)

GND	50	○	○	49	+5V input
GND	48	○	○	47	CH0
GND	46	○	○	45	CH1
GND	44	○	○	43	CH2
GND	42	○	○	41	CH3
GND	40	○	○	39	CH4
GND	38	○	○	37	CH5
GND	36	○	○	35	CH6
GND	34	○	○	33	CH7
GND	32	○	○	31	CH8
GND	30	○	○	29	CH9
GND	28	○	○	27	CH10
GND	26	○	○	25	CH11
GND	24	○	○	23	CH12
GND	22	○	○	21	CH13
GND	20	○	○	19	CH14
GND	18	○	○	17	CH15
GND	16	○	○	15	CH16
GND	14	○	○	13	CH17
GND	12	○	○	11	CH18
GND	10	○	○	9	CH19
GND	8	○	○	7	CH20
GND	6	○	○	5	CH21
GND	4	○	○	3	CH22
GND	2	○	○	1	CH23

CN6: 20-pin header
(DB-24PR only)

DO0	1	2	DO1
DO2	3	4	DO3
DO4	5	6	DO5
DO6	7	8	DO7
DO8	9	10	DO9
DO10	11	12	DO11
DO12	13	14	DO13
DO14	15	16	DO15
D.GND	17	18	D.GND
+5V	19	20	+12V

CN6: 37-pin D-sub connector
(DB-24PRD only)

CH0	37	○	○	19	GND
CH1	36	○	○	18	N.C.
CH2	35	○	○	17	GND
CH3	34	○	○	16	N.C.
CH4	33	○	○	15	GND
CH5	32	○	○	14	N,C,
CH6	31	○	○	13	GND
CH7	30	○	○	12	N.C.
CH16	29	○	○	11	GND
CH17	28	○	○	10	CH08
CH18	27	○	○	9	CH9
CH19	26	○	○	8	CH10
CH20	25	○	○	7	CH11
CH21	24	○	○	6	CH12
CH22	23	○	○	5	CH13
CH23	22	○	○	4	CH14
GND	21	○	○	3	CH15.
+5V	20	○	○	2	N.C.
			○	1	N.C.

CN1 : Screw terminal

CH0			CH2			CH4			CH6		
CM	NC	NO	CM	NC	NO	CM	NC	NO	CM	NC	NO

CN2 : Screw terminal

CH1			CH3			CH5			CH7		
CM	NC	NO	CM	NC	NO	CM	NC	NO	CM	NC	NO

CN3 : screw terminal

CH23		CH21		CH19		CH17		CH15		CH13		CH11		CH9	
NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM

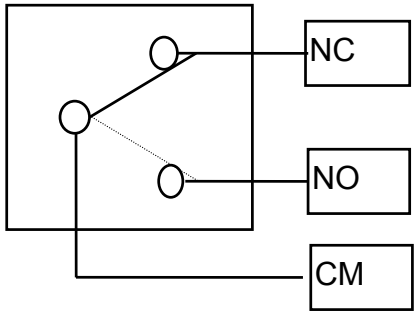
CN4 : screw terminal

CH22		CH20		CH18		CH16		CH14		CH12		CH10		CH8	
NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM

Note :

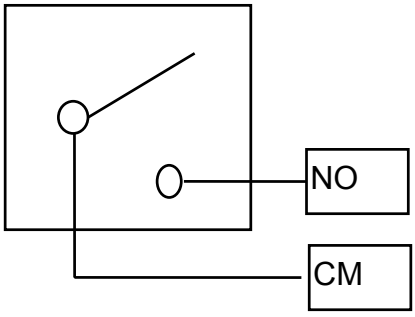
FOR Channel 0 ~ 7 Form C Relay screw terminals

CM : Common
NC : Normal Close
NO : Normal Open



For Channel 8 ~24 Form A Relay screw terminal

CM : Common
NO : Normal Open



7. DB-24C

24-Channel Open-Collector Output Board

The DB-24C has 24 channels of optically isolated digital outputs, arranged into four isolated banks. Each digital output offers a darlington transistor and integral suppression diode for inductive load. The board interface to field logic signals, eliminating ground-loop problems and isolating the host computer from damaging voltages. The DB-24C has one 37-pin D-sub connector, one 50-pin OPTO-22 compatible male header and one 20-pin male header.
The transistor is energized by applying a 5-voltage signal to the appropriate input channels on the 50-pin header or 20-pin header or 37-pin D-sub connector. Twenty-four enunciator LEDs, one for each transistor, light when their associated transistor is activated. Because there is a 37-pin D-sub connector on the board, the user may use it to interface to any TTL output board. In other words, the user may use it as a general purpose open-collector output board

7.1. Features

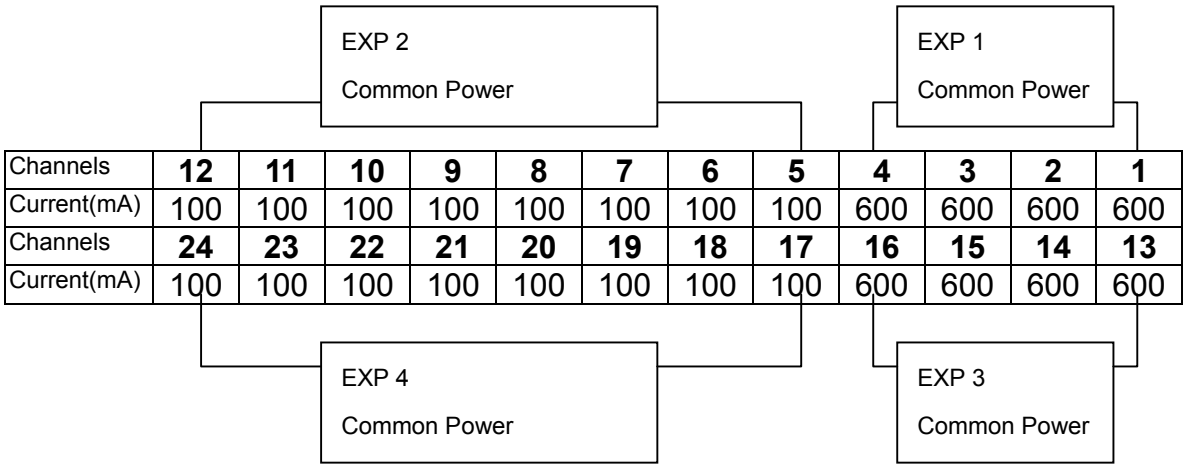
- Group A (low nibble) and Group B(high nibble) has 4-channel high current open-collector output each. The maximum load is 600mA per channels
- Group A(high nibble), Group B (low nibble), C(byte) and Group D has 8-channel open-collector output each. The maximum load is 100mA per channels.
- Accept 20-pin connector to control 8 high current output channel and 8 low current output channels.
- LEDs indicate each channel and power status.
- 3,750V optical isolation
- 5Vdc logic levels

7.2. Applications

- Leds indicate the status of transistor
- Screw terminals for easy field wiring
- OPTO-22 Compatible connector.
- D-sub connector 37-pin connector connects directly to PIO-D144, PIO-D96 and PIO-D24 board or another OPTO-22 board with ADP-37 adapter

7.3. Specification

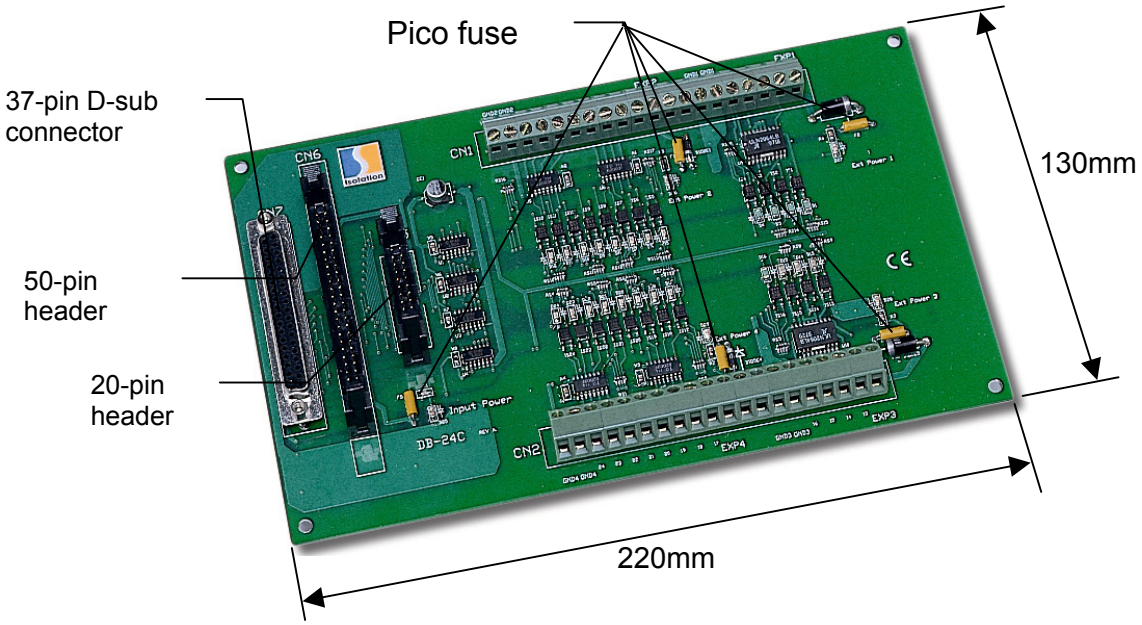
The maximum loading current of each high current output channel: 600mA
The maximum loading current of each low current output channel: 100mA
Power consumption: DC+5V @ 0.4Amax.
Dimension: 130mm X 220mm
Operating Temperature: 0-60 C
Storage Temperature: -20~70 C
Humidity: 5% to 90% non-condensing



Channels	12	11	10	9	8	7	6	5	4	3	2	1
Current(mA)	100	100	100	100	100	100	100	100	600	600	600	600
Channels	24	23	22	21	20	19	18	17	16	15	14	13
Current(mA)	100	100	100	100	100	100	100	100	600	600	600	600

Power	EXP1	EXP2	EXP3	EXP4
Input Voltage	5~24VDC	5~24VDC	5~24VDC	5~24VDC
Input Current	2.4A	0.8A	2.4A	0.8A
Fuse Protection	5A	1.5A	5A	1.5A

7.4. Layout



CN1 : External Power: 5~24VDC External Power: 5~24VDC

GND	GND	12	11	10	9	8	7	6	5	Exp2			GND	GND	4	3	2	1	Exp1
-	-	100	100	100	100	100	100	100	100	+			-	-	600	600	600	600	+

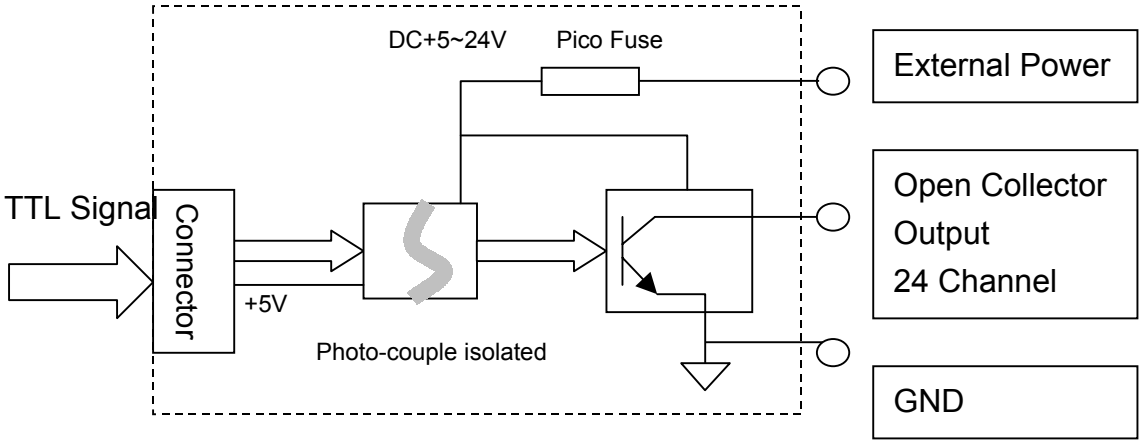
CH5~12 Max. Load :100mA CH1~4 Max. Load :600mA

CN2 : External Power: 5~24VDC External Power: 5~24VDC

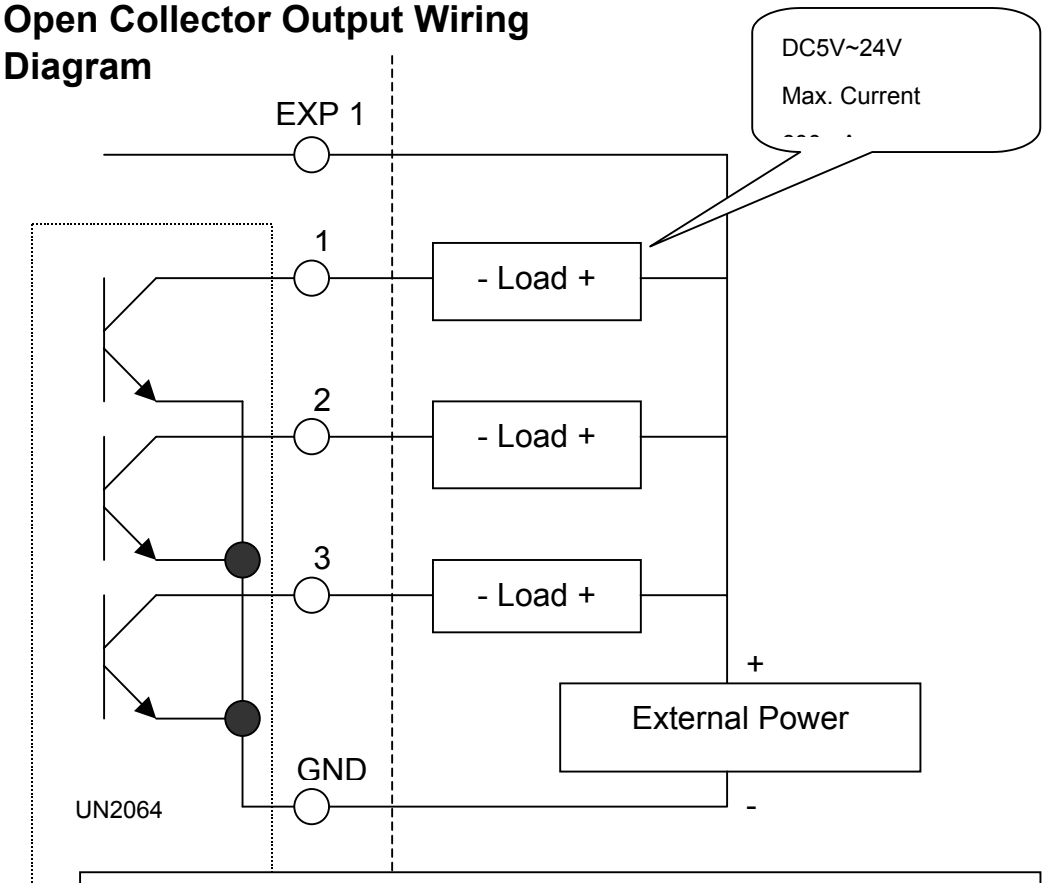
GND	GND	24	23	22	21	20	19	18	17	Exp4			GND	GND	16	15	14	13	Exp3
-	-	100	100	100	100	100	100	100	100	+			--	-	600	600	600	600	+

CH17~24 Max. Load :100mA CH13~16 Max.

7.5. Block Diagram



Open Collector Output Wiring Diagram



Output Channels: 1,2,3,4,13,14,15and 16 are 600mA (Max.)
Output Channels: 5~12and 17~24 are 100mA (Max.)
It will be damaged if overloaded .

8. DB-24OD

24-Channel Open Drain Output Board

The DB-24OD has 24-channel optically isolated digital output. The board is the interface for field logic signals, elimination ground-loop problems and isolating the host computer from damaging voltages. The DB-24OD has a single 37-pin D-sub connector, one 50-pin OPTO-22 compatible male header and a 20-pin male header. The transistor is powered by applying a 5-volt signal to the appropriate input channel on the 50-pin header, the 20-pin header or the 37-pin D-sub connector. Twenty-four indicator LEDs, one for each transistor, are lit when their associated transistor is activated. The board may be used to interface with any TTL output board, allowing it to be used as a general purpose open-drain output board.

8.1. Features

- 24-channel high current open-drain output.
- Connects directly to OPTP-22 compatible board or any 722,724 series board
- 24-channel max load 400 mA(per channel)
- LEDs indicate each channel and power status
- 3,750V optical isolation
- 5VDC logic levels

8.2. Specification

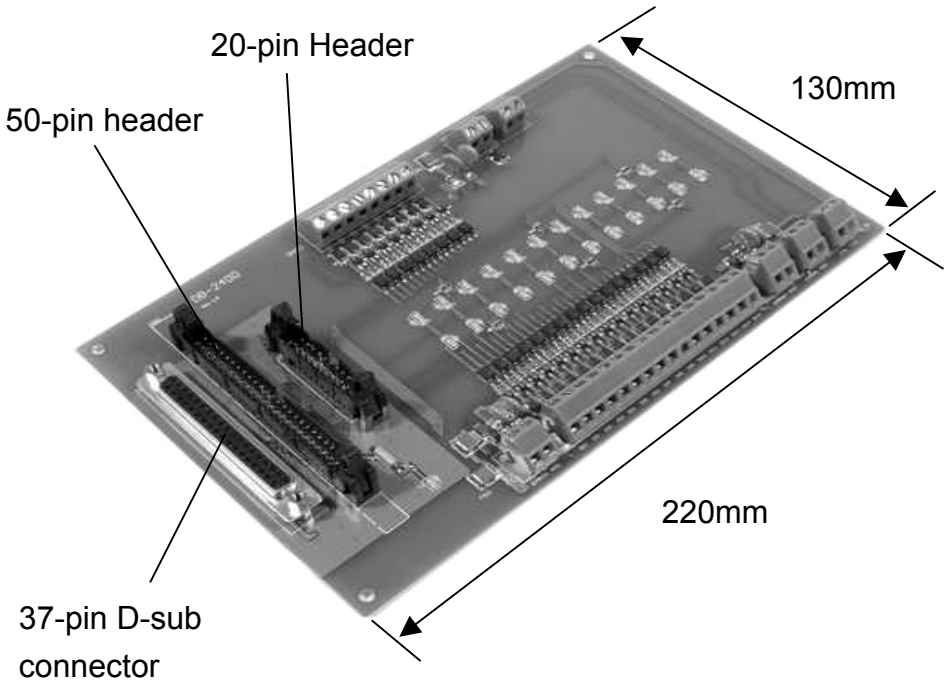
- The maximum loading current of each high current output channel : 400mA.
- Power consumption :DC+5V @0.4Amax
- Dimension :1305mm X 220mm
- Operation Temperature :0~60 °C
- Storage Temperature :-20~70 °C
- Humidity :5% to 90% non-condensing

8.3. Application

- On/off control
- Energy management
- Test Automation
- Process Control

Power	EXPWR1	EXPWR2	EXPWR3
Input Voltage	10~24VDC	10~24VDC	10~24VDC
Input Current	250mA	250mA	250mA

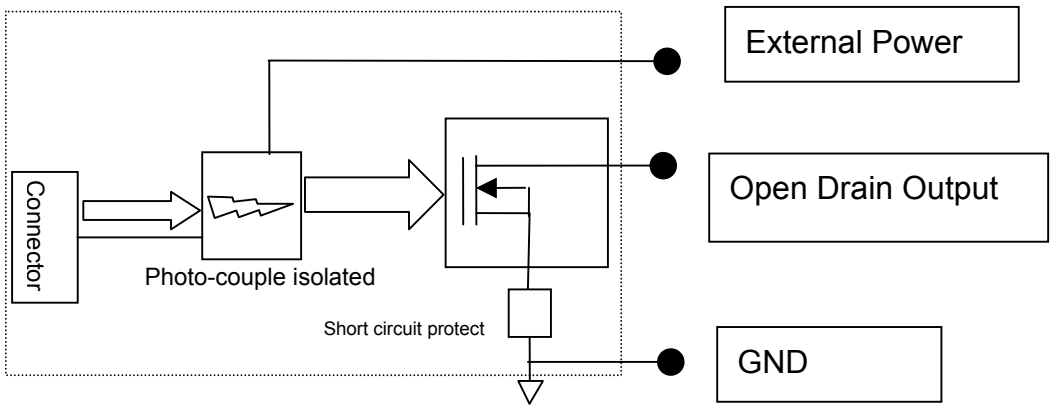
8.4. Layout



8.5. Pin Assignment

External Power Input	Output pin
EXPWR1, GND1	D0~D7
EXPWR2, GND2	D8~D15
EXPWR3, GND3	D16~D23

8.6. Block Diagram



9. DB-24POR

24-Channel Photo Output Board

The DB-24POR includes 24 normally open, form A, Photo-MOS relays. The board interface to field logic signals, eliminating ground-loop problems and isolating the host computer from damaging voltages. The user can use the DB-24POR to switch load, up to 350VAC and up to 130mA, The relay is energized by applying a 5 voltage signal to the appropriate relay channel on the 50-pin OPTO-22 compatible connector or 37-pin D-sub connector. Twenty-four indicators LEDs, one for each relay, light when their associated relay is activated. Because there is a D-sub 37-pin connector on the board, the user may use it to interface to any TTL output board. In other words, the user may use it as a general-purpose photo-MOS relay output board.

9.1. Features

- 24 Optically isolated digital output channels
- 24 form A photo-MOS relays
- Switch up to max. 0.13A at max. 350VAC
- 5VDC logic levels
- 5,000V optically isolation
- LED's indicated relay status
- Built-in fuses and diodes to protect from wrong connection of external power supply.
- 50-pin header connector directly to DIO-24, DIO-48,DIO144 and PIO-D144, PIO-D96, PIO-D56, PIO-D48, PIO-D24 and other OPTO-22 compatible digital output boards.
- D-sub 37-pin connector connects directly to PIO-D144, PIO-D96, PIO-D56, PIO-D48 and PIO-D24 digital output boards.

9.2. Applications

- ON/OFF Control
- Energy management
- IC factory Automation
- Test Automation

9.3. Specification

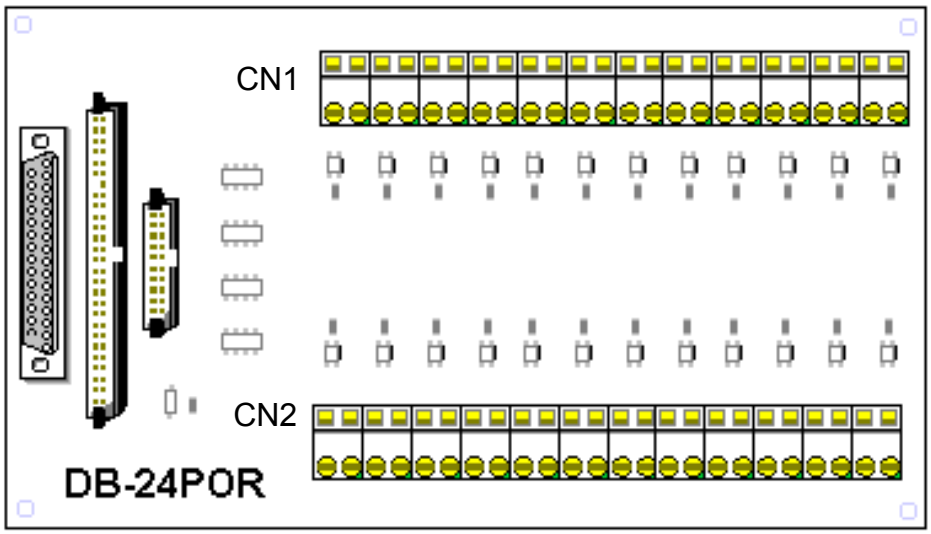
- Photo-MOS Relay

Item	Spec.	Note
Turn On Time	0.7mS	Typical
Turn Off time	0.05mS	Typical
Output On resistance	23Ω	Typical
Load Voltage	350VAC	Peak AC
Continuous load current	130mA	Peak AC
Power dissipation	500mW	
Input / Output Isolation	5,000V	

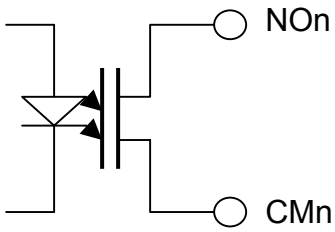
- Dimensions: 130mm X 220mm
- Operating Temperature : 0~60°C
- Storage Temperature: -20°C~70°C
- Humidity : 5% to 90%, non-condensing

9.4. Layout

CN3 CN4 CN5

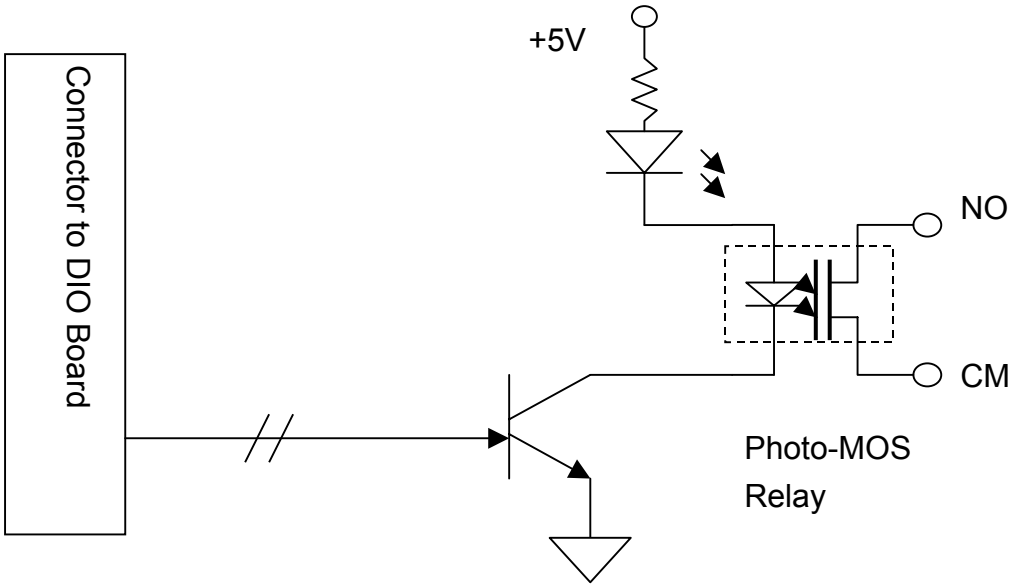


Channel 0~23	NOn	CMn
Form A	Normal Open	Common

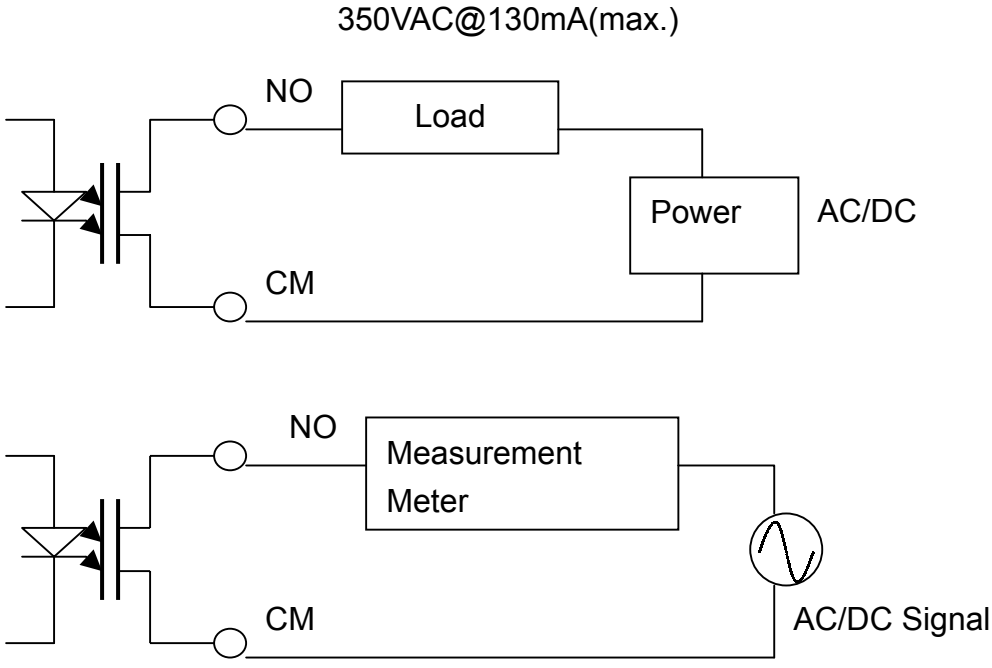


Form A type Photo-MOS Relay

9.5. Block diagram



9.6. Wiring Diagram



10. DB-24SSR

24-Channel Solid State Relay Board

The DB-24SSR includes 24 normally open, or form A, solid-state relays The board interface to filed logic signals, eliminating ground-loop problems and isolating the host computer from damaging voltages. The user can use the DB-24SSR to switch high voltage load, up to 240VAC and up to 4A. The relay is energized by applying a 5-voltage signal to the appropriate relay channel on the 50-pin header or 37-pin D-sub connector. Twenty-four enunciator LEDs, one for each relay, light when their associated relay is activated. Because there is a D-sub 37-pin connector on the board, the user may use it to interface to any TTL output board. In other words, the user may use it as a general purpose solid state relay output board.

10.1. Features

- 24 optically isolated digital output channels
- 24 form A solid-state relays
- Switch up to 4A at 250VAC
- 5VDC logic levels
- 2,500VAC optical isolation
- Built-in varistor.
- Screw terminal for easy field wiring
- Can choose plug-in screw-terminal, modification and ensuring simple installation, modification and maintenance
- 50-pin header connects directly to DIO-24,DIO-48,DIO144,PIO-D144, PIO-D96, PIO-D48, and PIO-D24 OPTO-22 compatible board
- D-Sub 37-pin connector connects directly to PIO-D144, PIO-D96, PIO-D48 and PIO-D24 board or another OPTO-22 board with ADP-37 adapter

10.2. Applications

- ON/OFF control
- Energy management
- Test Automation
- Process Control

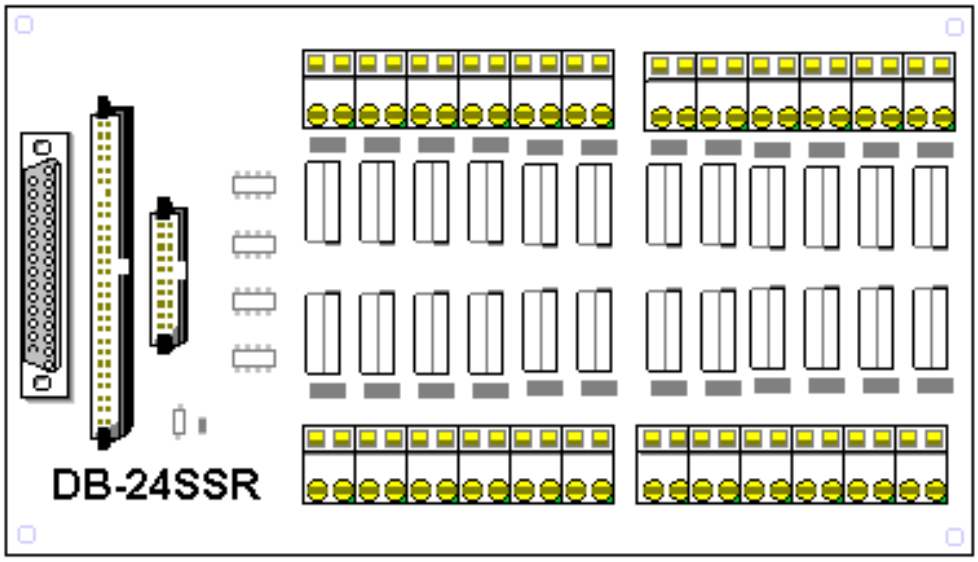
10.3. Specification

- Solid State Relay (AC)

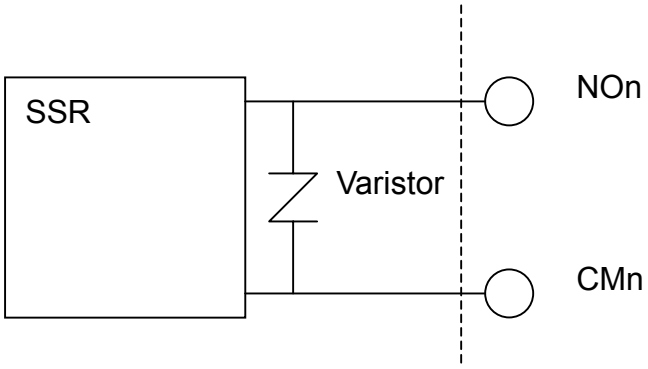
Load Voltage	50~250VAC
Maxi. Load Current	4A
Repetitive Peak OFF Voltage	600V
Max. “ON-state “ Voltage Drop	1.5V
Surge Current	50A
Maxi. “OFF-State” Leakage Current	5mA
Mini. Load Current	20mA
Breakdown Voltage	2,500V (Between Input & Output)
Insulation resistance. i.	100,000,000Ω(min.)
Operate time , 1/2 cycle of voltage sine wave	1mS (max.)
Zero Crossing	Yes
Snubber Circuit	Yes

- Power Consumption: +5V@0.4A(max.)
- Dimension: 130mm X 220mm
- Operation Temperature : 0~60°C
- Storage Temperature : -20°C~70°C
- Humidity : 5% to 90% non-condensing

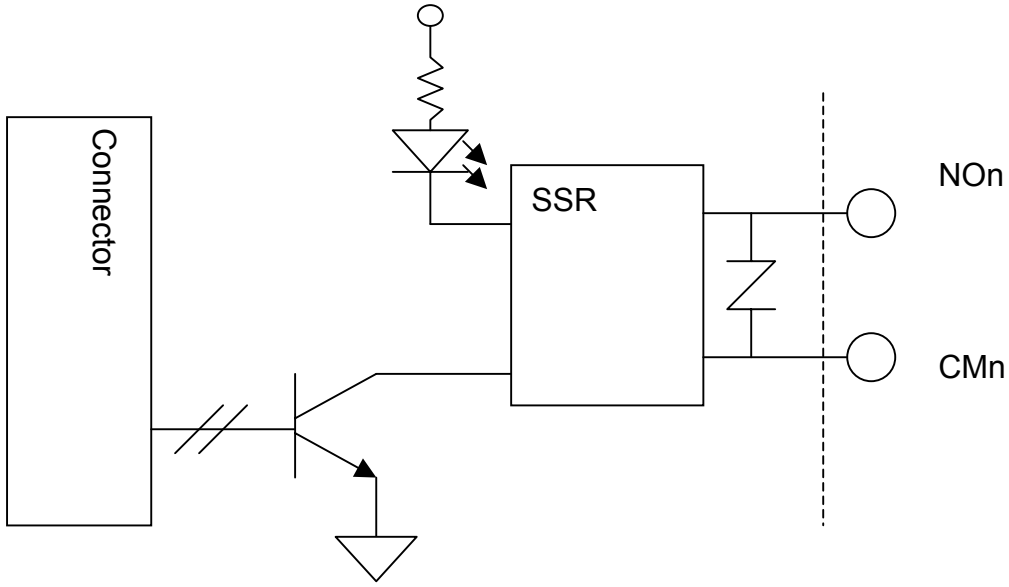
10.4. Layout



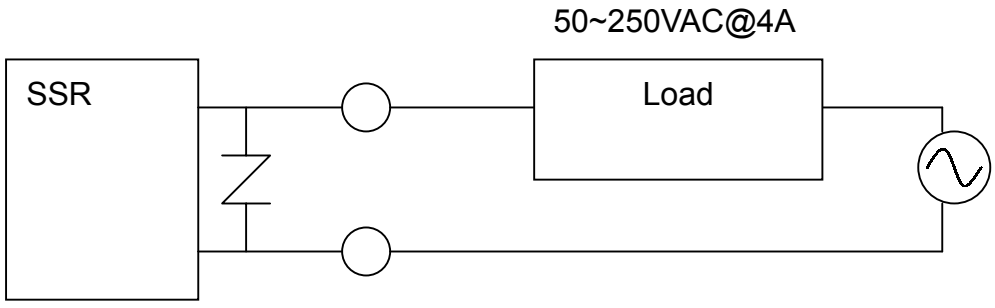
Channel 0~23	NOn	CMn
Form A	Normal Open	Common



10.5. Block Diagram



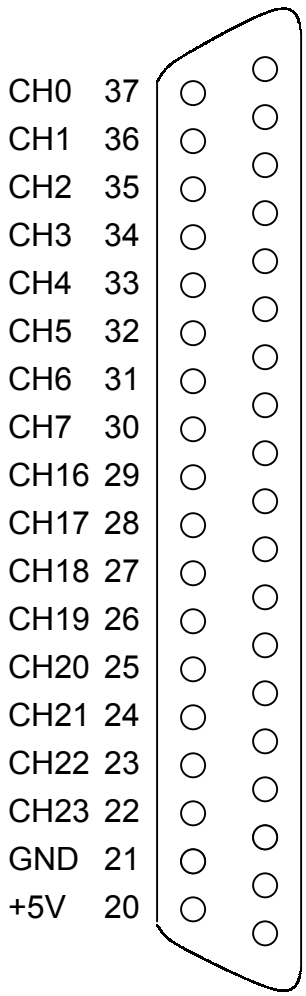
10.6. Wiring Diagram



10.7. Pin Assignment

DB-24C / DB-24POR / DB-24SSR

CN3 Pin Assignment



CH0	37	1	GND	
CH1	36	9	N.C.	
CH2	35	1	GND	
CH3	34	8	N.C.	
CH4	33	1	GND	
CH5	32	7	N,C,	
CH6	31	1	GND	
CH7	30	6	N.C.	
CH16	29	1	GND	
CH17	28	5	CH08	
CH18	27	1	CH9	
CH19	26	4	CH10	
CH20	25	1	CH11	
CH21	24	3	CH12	
CH22	23	1	CH13	
CH23	22	2	CH14	
GND	21	11	CH15.	
+5V	20	1	N.C.	
		0	N.C.	

CN4 Pin Assignment

GND	50	49	+5V input		
GND	48	47	CH0		
GND	46	45	CH1		
GND	44	43	CH2		
GND	42	41	CH3		
GND	40	39	CH4		
GND	38	37	CH5		
GND	36	35	CH6		
GND	34	33	CH7		
GND	32	31	CH8		
GND	30	29	CH9		
GND	28	27	CH10		
GND	26	25	CH11		
GND	24	23	CH12		
GND	22	21	CH13		
GND	20	19	CH14		
GND	18	17	CH15		
GND	16	15	CH16		
GND	14	13	CH17		
GND	12	11	CH18		
GND	10	9	CH19		
GND	8	7	CH20		
GND	6	5	CH21		
GND	4	3	CH22		
GND	2	1	CH23		

CN5 Pin Assignment

CH1	2	1	CH0		
CH3	4	3	CH2		
CH5	6	5	CH4		
CH7	8	7	CH6		
CH9	10	9	CH8		
CH11	12	11	CH10		
CH13	14	13	CH12		
CH15	16	15	CH14		
GND	18	17	GND		
N.C.	20	19	+5v		

Note:

+5V : Power input DC +5V

GND: Power's Ground

CHn : TTL's Signal

11. DB-24P 24 Photo-Isolated

Digital Input Terminal Board

The general specification of DB-24P is the same as DB-16P. But DB-24P has one Opto-22 compatible 50-pin connector and can be used for 24 channel photo-isolated digital input .
The DB-24PD is almost the same as DB-24P. But DB-24PD has one 37-pin D-sub connector.

11.1. Features

- 24 optically isolated digital input
- connected to DIO-24 , DIO-48 , DIO-144 or any OPTO-22 compatible connector of digital input / output board.
- DB-24PD connect to PIO-D144 , PIO-D96 , PIO-D48 and PIO-D24
- AC/DC Signal Input
- AC Signal Input with filter
- Input buffer with voltage comparators
- 1,000V isolation
- Each channel has it's LED indicator

11.2. Applications

- Isolated digital input sensing
- Process monitoring

11.3. Specification

- I/O connector Electrical Specifications
  Configuration: optically isolated digital input channels
  Compatibility: TTL compatible
- Digital Input
  Number of channels: 24 Channels
  each channel with its own ground reference isolated from other channels
  Maximum input voltage: 24 VDC or 24 VAC

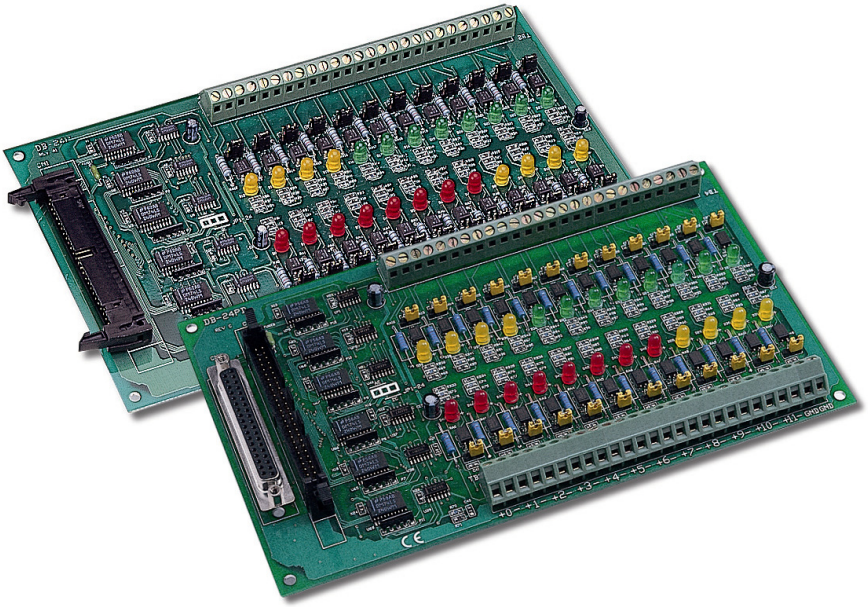
  Digital Logic Level:

Level	Minimum	Maximum
Input low voltage (DC or peak AC)	0	+/-1V
Input high voltage DC 1kHz AC	+/- 3.8VDC 4Vrms	+/-24VDC 24VAC

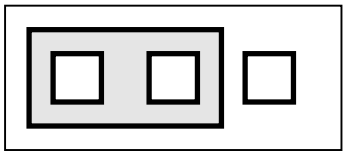
  Input impedance: 1.2k
  Input Current
  5V inputs : 4 mA /channel
  24V inputs : 20 mA /channel
  Input Response Time :20μs without filter / 2.2ms with filter
- Power consumption : DB-24P 290mA/ +5V (Max) from PC
- Board Dimensions : 9.7 “ (220mm) X 5.7” (130mm)
- Operating Environment
  Component temperature : 0 to 50°C
  Relativity humidity : 5% to 90% non condensing
- Storage Environment
  Temperature: 0-60°C
  Relative humidity: 5% to 90 % non condensing

11.4. Layout

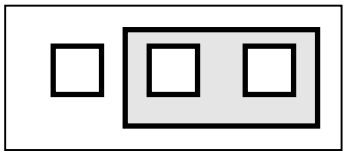
DB-24P / DB-24PD



11.5. Jumper setting

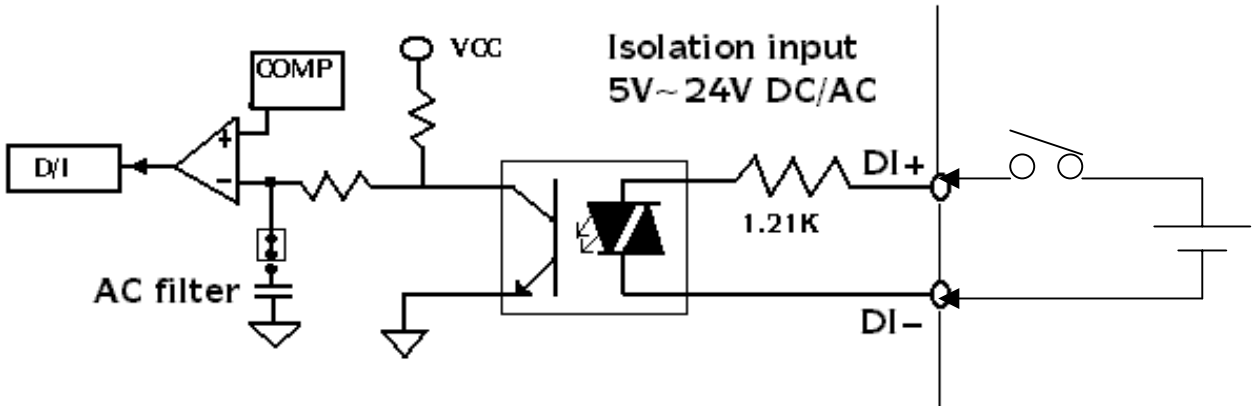


With filter for AC signal



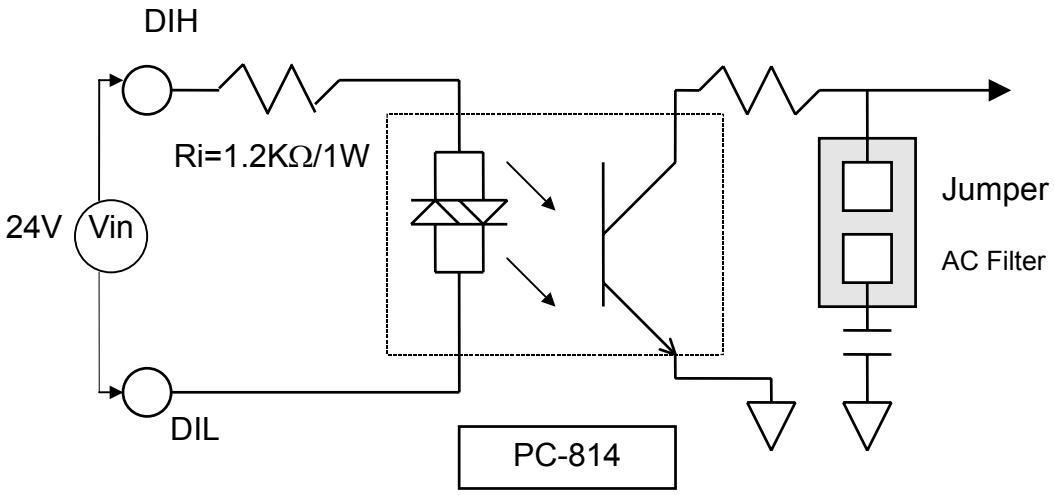
Without filter for DC signal

If you are using AC signal, You must short the AC FILTER jumper.
If you are using DC input signals, the AC FILTER is optional. If the response time of input signals less than 20μs, set the filter off. If you want a slow response (about 5 to 10 ms) for rejecting noise or contact bouncing, short the AC FILTER jumper.



11.6. Isolated Input

The normal input voltage range is 5 to 24 V AC or DC . The normal input range can be changed by choosing suitable resistor to limit the current through the Photo-isolator to about 10 mA(**I**f). The default resistor is 1.2KΩ/1 W.



Ri = Vin/**I**f

Pw = **V**in x **I**f

Calculation Example:

If **V**in =120V then **R**i=120(V) /0.01(A)=12KΩ

Pw=120(V) x 0.01(A) =1..2W

The **R**i must be replaced by 12KΩ/2W(1.2W)

- TB3 Pin Assignment

Pin Number	1	2	3	4	5	6	7	8	9	10	11	12	13
Label	0H	0L	1H	1L	2H	2L	3H	3L	4H	4L	5H	5L	6H

Pin Number	14	15	16	17	18	19	20	21	22	23	24	25	26
Label	6L	7H	7L	8H	8L	9H	9L	10H	10L	11H	11L	GND	GND

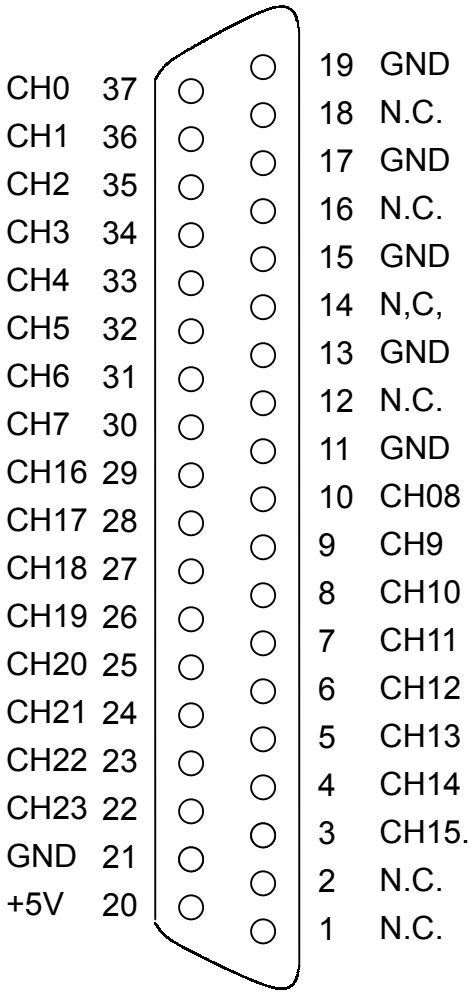
- TB2 Pin Assignment

Pin Number	1	2	3	4	5	6	7	8	9	10	11	12	13
Label	12H	12L	13H	13L	14H	14L	15H	15L	16H	16L	17H	17L	18H

Pin Number	14	15	16	17	18	19	20	21	22	23	24	25	26
Label	18L	19H	19L	20H	20L	21H	21L	22H	22L	23H	23L	+5V	+5V

- DB-24P: CN1 OPTO-22 Connector Pin Assignment

DB-24PD : D-sub connector Pin Assignment



DB-24P: Pin Assignment

GND	50	○	○	49	+5V input
GND	48	○	○	47	CH0
GND	46	○	○	45	CH1
GND	44	○	○	43	CH2
GND	42	○	○	41	CH3
GND	40	○	○	39	CH4
GND	38	○	○	37	CH5
GND	36	○	○	35	CH6
GND	34	○	○	33	CH7
GND	32	○	○	31	CH8
GND	30	○	○	29	CH9
GND	28	○	○	27	CH10
GND	26	○	○	25	CH11
GND	24	○	○	23	CH12
GND	22	○	○	21	CH13
GND	20	○	○	19	CH14
GND	18	○	○	17	CH15
GND	16	○	○	15	CH16
GND	14	○	○	13	CH17
GND	12	○	○	11	CH18
GND	10	○	○	9	CH19
GND	8	○	○	7	CH20
GND	6	○	○	5	CH21
GND	4	○	○	3	CH22
GND	2	○	○	1	CH23

Note:

+5V : Power input DC +5V

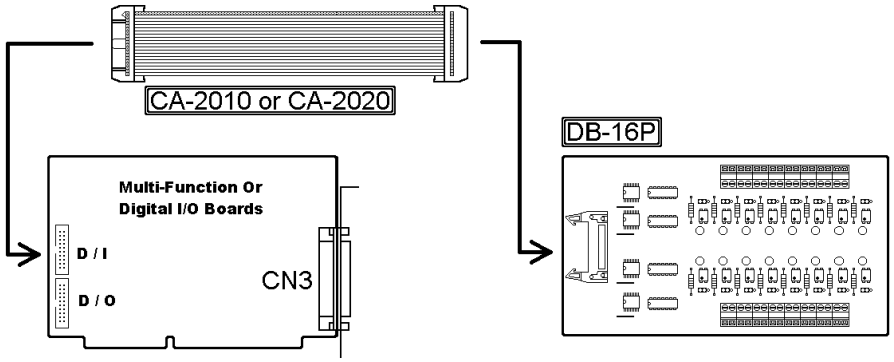
GND: Power's Ground

CHn : TTL's Signal

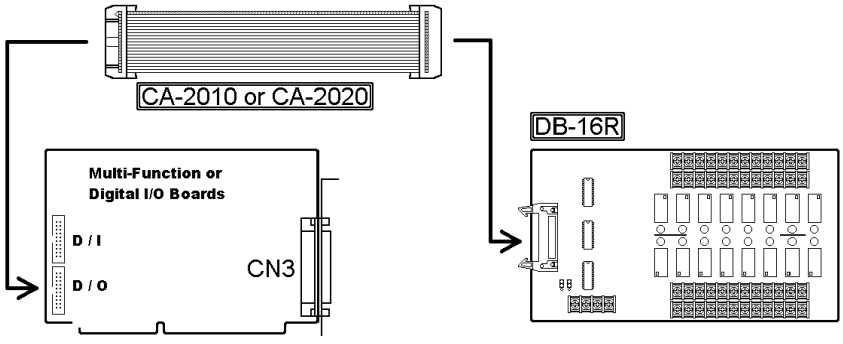
12. Configuration

12.1. Connect to DIO Board

DB-16P / DB-16R connect to 20-pin digital input / output connector

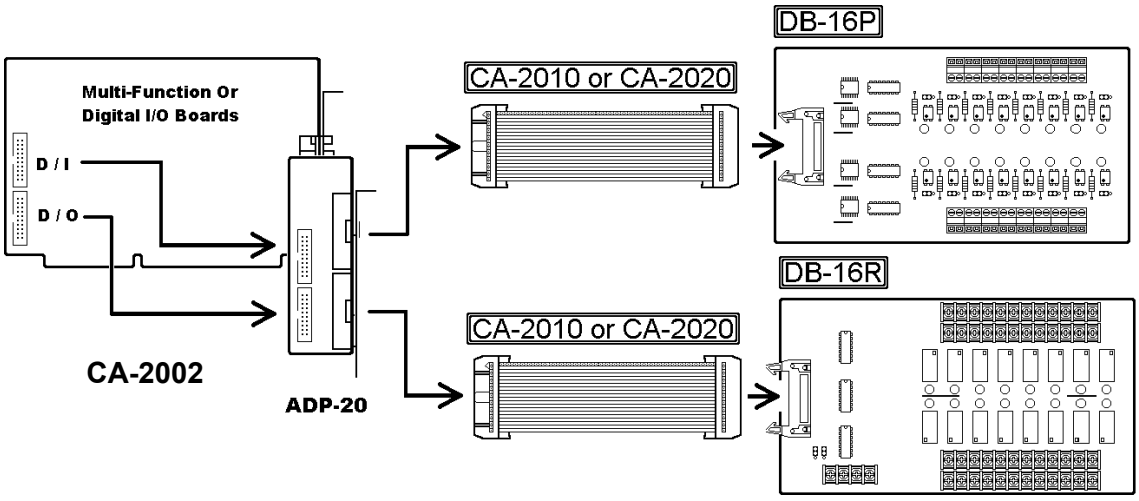


DB-16P linked to digital input port of multi-function board

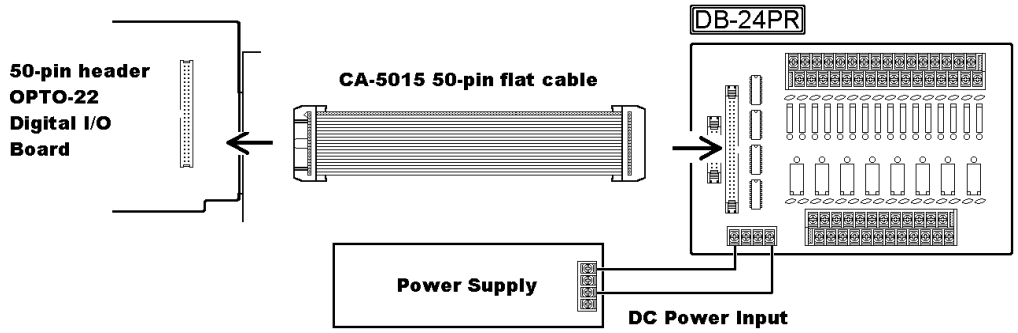


DB-16R linked to digital output port of multi-function board

The DB-16P / DB-16R linked to Multi-Function board via ADP-20 extender.

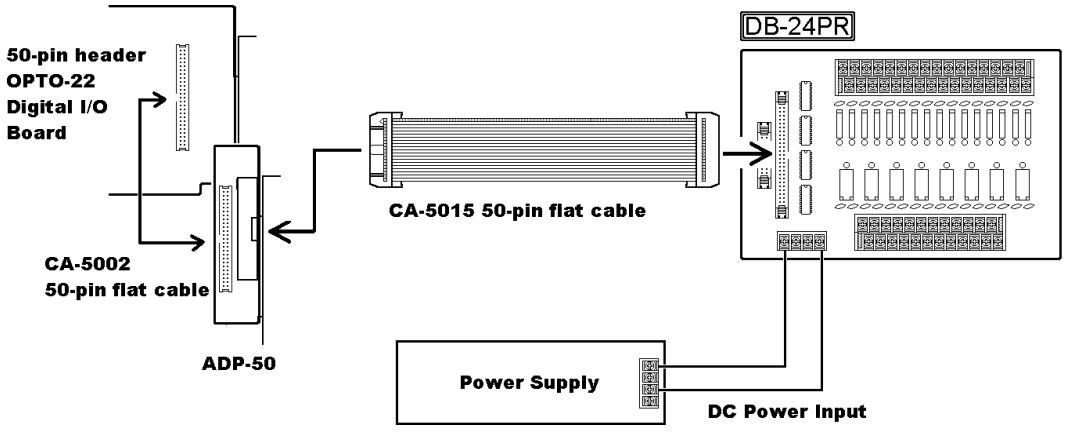


50-pin OPTO-22 compatible connector directly connected



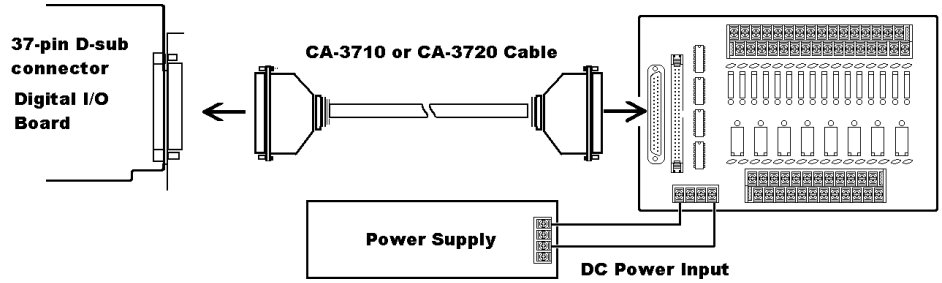
DIO-24
DIO-48
DIO-144
PIO-D144
PIO-D96
PIO-D48

DB-24R / DB-24RD
DB-24PR / DB-24PRD
DB-24C / DB-24POR
DB-24SSR



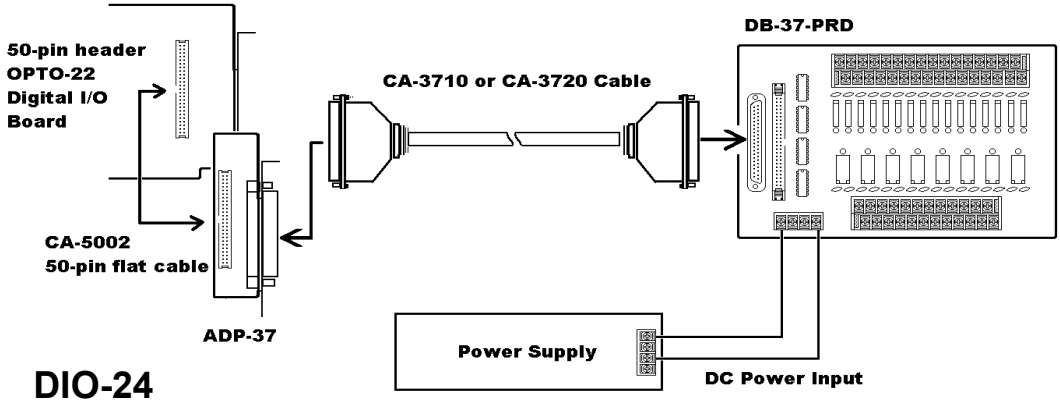
Connect to 37-pin D-sub connector

PIO-D144 / PIO-D96 / PIO-D48
37-pin D-sub DI/O card



DB-24RD
DB-24PRD
DB-24C / DB-24POR
DB-24SSR

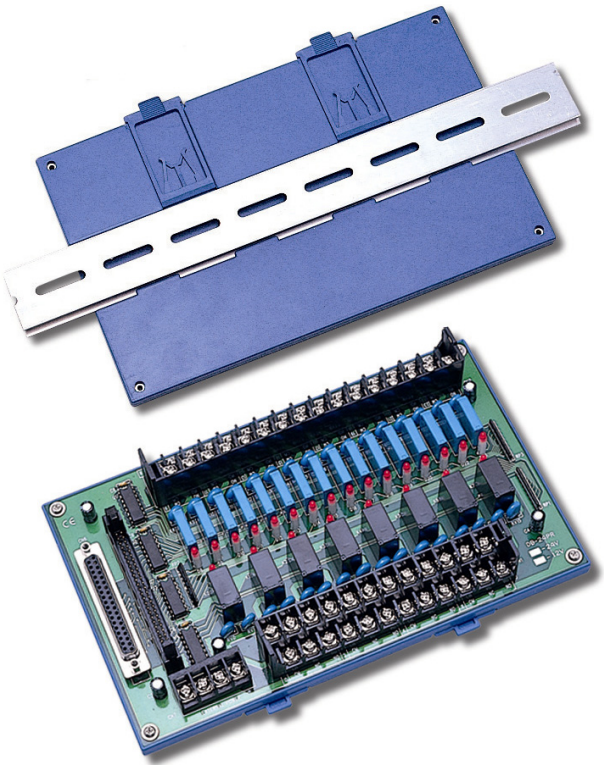
50-pin header convert to 37-pin D-sub connector via the ADP-37



DIO-24
DIO-48
DIO-144
PIO-D144
PIO-D96
PIO-D48

12.2. DIN-Rail Mounting

The DB-24P,DB-24R, DB-24PR, DB-24C, DB-24POR, DB-24SSR, DB-16P8R series daughter boards can choose DIN-OPTO22 kit for DIN-Rail mounting.



DB-24P/DIN
DB-24PD/DIN
DB-24R/DIN
DB-24RD/DIN
DB-24PR/DIN
DB-24PRD/DIN
DB-24C/DIN
DB-24POR/DIN
DB-24SSR/DIN
DB-16P8R/DIN